

**BLINDNESS  
AND  
OCULAR MORBIDITY  
IN  
TWO RURAL BLOCKS  
OF  
PUNJAB AND HARYANA**

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**Report on research activities carried out during 1968-70**

of the

**Establishment of a Pilot Rehabilitation Centre and Mobile Ophthalmological unit for persons disabled by eye disorders.**

**PROJECT NO.**

**VRA-IND-39-68/19-P-58135-F-01**

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# INTRODUCTION

After considerable labour, the Trachoma Control Project (under Indian Council of Medical Research) in 1964 disclosed that amongst a rural population of 355 million in the 15 States of India, 19.9 million have impairment of vision of various degrees, out of which 3.5 million are economically blind. Before this report was published, some analytical work on ocular problems in the country had appeared following contact studies or through sending questionnaires to medical centres. (Ursekar 1954, Cooper 1965, Agarwal 1963 etc.) but after the publication of this report, much interest was shown by the Ophthalmologists in the country (Saxena '66, Venkataswamy '66, Shukla '66, Krishnamurthy '66, Agarwal '66, Chatterjee '68, Franken '68, Ghosh '69). These studies laid stress on the pattern of disease distribution, an important first step for planning any far reaching strategy to combat any disease. To check blindness, it becomes imperative to know the factors contributing towards its causation. In this part of the country, Franken (1968) was the first to study the problem in Punjab on scientific lines. The study contemplated by the author (Franken) included comparison of the pattern of various ocular disorders in dry and fertile zones of the plains of Punjab and in mountainous Himalayan terrain. Chatterjee ('68) presented his figures from Lahaul & Spiti. Franken ('68) completed this work in the dry belt of Punjab but work in the fertile belt remained undone. To fill in this gap this study was undertaken in the vicinity of Chandigarh.

In November 1967, an understanding was signed between the Vocational Rehabilitation Administration, Government of the U.S.A. and the Director, Post Graduate Institute of Medical Education & Research, Chandigarh. Thus, the Research Project "ESTABLISHMENT OF A PILOT REHABILITATION CENTRE AND MOBILE OPHTHALMOLOGICAL UNIT FOR PERSONS DISABLED BY EYE DISEASES" was established. The actual work commenced in April 1968, Amongst the many objectives, one was to collect and analyse data on such matters as the incidence and prevalence of blindness, the causes in relation to age and the extent of damage, and the medical, vocational and economic needs of persons with eye disorders with a view to making far reaching recommendations on the most effective way to combat those problems.

Present study is the outcome in pursuance of this objective Two blocks -- one each from Punjab and Haryana -- were selected for this study.

## P R E F A C E

Nobody can claim to be more informed than myself about my shortcomings. Only those who happen to have personal experience of going to villages can understand the hardships that this team of workers had to endure. One has to shed the ego of being a City Babu before going to village, and then after crossing all the barriers of the rugged terrain, one should be ready to face both the active and passive resistance of the villagers, who have all the reasons to suspect the motives and treat you as an alien. But that is all in the game. I am thankful to all the thousands of persons who have allowed us to examine their eyes, and made it possible for us to compile this report. The encouragement of the Director of the Post Graduate Institute of Medical Education & Research, Chandigarh, Dr. P. N. Chuttani and the guidance and economic support of the Rehabilitation Department of the U.S. Government have made it possible for us (or facilitated us) to reach the REAL INDIA—the RURAL INDIA. With the support still continuing, the survey of Chandigarh and the surrounding villages is in progress.

This report is not all-inclusive, but certain salient features are highlighted. I express my thanks to all those working in the Project for their untiring work and skill.

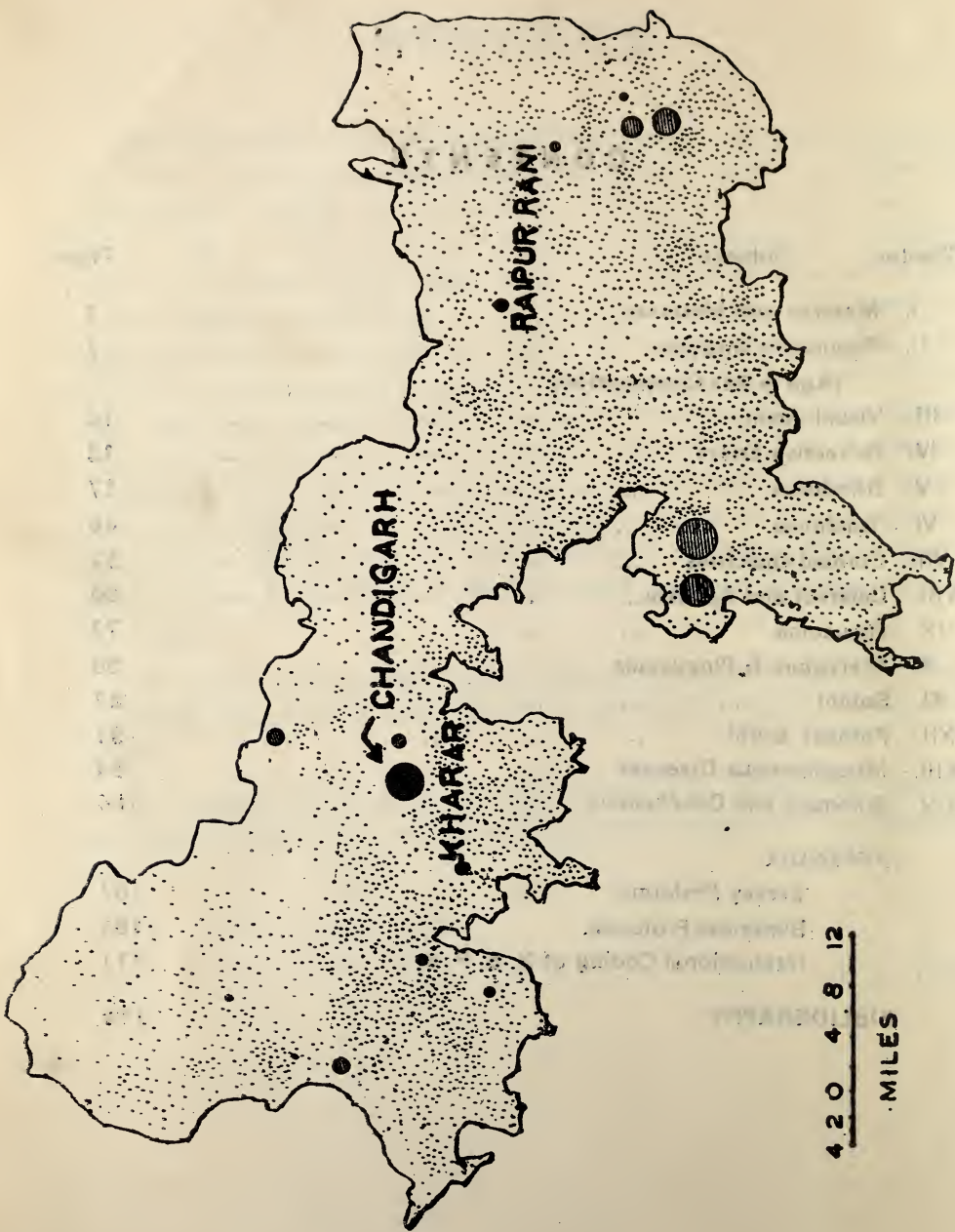
I must also put on record my thanks to Mr. H. D. Gupta, the Institute statistician for guiding our Project statistician and helping us in our statistical work.

I. S. JAIN



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# Chapter I

## Material and Methods

Kharar and Raipur Blocks are adjoining Chandigarh. (Fig. I)

Kharar Block is situated in Punjab State while Raipur Rani Block in Haryana State. Both the blocks lie between  $30^{\circ}-02'-25''$  and  $31^{\circ}-10'-35''$  North Latitude and  $76^{\circ}-10'-55''$  and  $77^{\circ}-36'-20''$  East Longitude. The general population of Kharar Block is about 97396 and that of Raipur Rani Block about 91139.

Simple random sample was drawn for Raipur Rani Block and stratified sample for Kharar Block. 5% sample was selected for the former and 8% for the latter. 4,601 persons in the Raipur Rani Block and 8 142 persons in the Kharar Block were examined. However 2,193 more persons from the Kharar Block were examined including 321 of the 'Pilot Project' study, but for scientific analysis they have not been included in this study.

### Climate

It is quite hot in summer and sufficiently cold in winter. The temperature begins to rise in March, it goes on rising till the mercury touches  $116^{\circ}$  F or ever more towards the middle of June. Hot winds blow over the land but the heavy dust storms are rare. The rainy season sets in by the fourth week of July and continues till about the end of September. During this period the temperature comes down considerably when it rains but again shoots up when the rains stop. The atmosphere then is sultry and distressing. From October, the weather turns to fine and by the end of October winter season sets in. November and December are pleasant, generally free from rains. January and February are months of severe cold and may experience mild rains. Average rainfall is 34.3 inches.

The economy of the area is based primarily on agriculture. In the 1951 census, 57.82 percent of the population was classed as dependent upon agriculture, but in the 1961 Census, 46.39 percent of the total working force were cultivators and agricultural labourers. The lower figure for 1961 is due partly to non-cultivating landowners not being classed as workers if they do no other work.

Land in the area is fairly fertile. The potentialities for production of paddy, maize, wheat, groundnut, sarson and sugarcane are great. The peasantry consists of hard working Jat Sikhs, Rajputs, Gujjars and Sainis.

There are three economic groupings among the farmers :

- (a) Peasant-proprietors.

- (b) Tenants,
- (c) Labourers.

Most of the cultivators are peasant-proprietors, owning and cultivating their own land.

### Size and Operational Holdings :

As many as 31.8 per cent of the house-holds in villages are engaged in cultivation in the capacity of peasant proprietors and tenants, but excluding such households who had let out their lands in entirety or were dependent on agricultural labour. The households of peasant proprietors and tenants are distributed below according to the size of their operational holdings.

**Table I**

Distribution per 1000 households engaged in cultivation by interest in land and size of land cultivated in rural areas only.

| <i>Size of Operation holdings</i> | <i>Per 1,000 distribution of households</i> |
|-----------------------------------|---------------------------------------------|
| Less than 1 acre                  | 9.07                                        |
| 1.0 — 2.4 "                       | 83.77                                       |
| 2.5 — 4.9 "                       | 126.93                                      |
| 5.0 — 7.4 "                       | 181.76                                      |
| 7.5 — 9.9 "                       | 119.93                                      |
| 10.0—12.4 "                       | 153.19                                      |
| 12.5—14.9 "                       | 59.94                                       |
| 15.0—29.9 "                       | 190.77                                      |
| 30.0—49.9 "                       | 50.86                                       |
| 50.0 and above                    | 17.07                                       |

### Education :

According to the calculation based on sample population the literacy percentage of the area was 14% in the 1951 census. In the 1961 census, the literacy percentage was 30%.

The scheduled caste and backward classes, particularly those inhabiting in the rural areas, still lag in education. Education is free up to Middle Standard in all Government and provincialised schools.

### Specifications of supporting enquiries :

Before instituting regular survey, a pilot project was undertaken in village

Lambian (Kharar Block) in order to :—

- (i) Get an idea about the variability of population characteristics and to determine, if the size of the sample was adequate.
- (ii) To test the utility of various procedures under field conditions before incorporating them in the survey.
- (iii) To test proformas and other necessary documentation.
- (iv) To estimate the work rate in the given time and resources under actual field conditions.

### Objectives :

Every developing country is besieged with plans for rehabilitation and therapeutic work. But before any such plan can be formulated, it is imperative that an accurate assessment is carried out to evaluate the degree of the problem at hand. Several attempts have been made by various workers utilizing different techniques e. g. Hospital statistics, (Venkataswamy, 1961, Shukla, 1965), by sending questionnaires to medical centres (Ursekar, 1955, Cooper 1955).

These being biased studies do not reflect the disease pattern accurately. Many general surveys have been done with specific disease in mind (Krishnamoorthy 1966, Sarda 1961), but few take into account an analytical ophthalmic morbidity of a community. (Aggarwal 1963, 1966, 1967; Franken et al 1968; Ghosh 1969). The latter survey by Franken has been conducted in the dry belt of Panjab and Haryana. The present study was done in order to find out the pattern of ophthalmic morbidity in the fertile zone of Punjab. The ultimate aim being to compare it with Chandigarh, considering the impact of education, vocation and socio-economic status, geographic factors remaining the same.

- (a) The objective of this study was to get information of pattern of ophthalmic diseases
- (b) To evaluate, if possible, any factor responsible for a particular disease.
- (c) To assess the ophthalmic requirements of the area in terms of medical and surgical needs.

### Road Transport :

Though motor vehicles are becoming increasingly popular yet bullock carts still hold sway in the country-side for conveyance and carriage of goods. They are well suited for the rugged country-side where the sophisticated modern vehicles dare not tread. Mostly unmetalled roads are not fit for them. Cycles are extensively used in the villages.

More general information in Kharar and Raiqur Rani Blocks is tabulated.



Table II

| Kharar                            |     | Raipur Rani                       |     |
|-----------------------------------|-----|-----------------------------------|-----|
| Total Villages Examined : 22      |     | Total Villages Examined : 29      |     |
| <i>Present in no. of villages</i> |     | <i>Present in no. of villages</i> |     |
| 'Pucca' Approach Road             | 3   |                                   | 1   |
| DISPENSARY Local                  | 2   |                                   | 2   |
| within 3 km.                      | 5   |                                   | 1   |
| more than 3 km.                   | 15  |                                   | 26  |
| SCHOOL Local                      | 17  |                                   | 12  |
| Within 3 Km.                      | 5   |                                   | 7   |
| More than 3 Km.                   | —   |                                   | 10  |
| Literacy rate 1961 Census)        | 30% |                                   | 30% |
| Density of population per Sq.     |     |                                   |     |
| Mile (1961 census)                | 801 |                                   | 920 |
| Average population/village        |     |                                   |     |
| (1961 census)                     | 600 |                                   | 453 |

(d) To study the prevalence rate of blindness and the needs for rehabilitation.

### Working technique

The survey team consisted of the following;

- Research Officer Postgraduate in Ophthalmology with considerable experience.
- Assistant Research Officer ; Postgraduate
- Refractionist with Diploma in refraction and optometry;
- Other paramedical personnel including male staff nurse, publicist man, Driver and one or two nursing attendants.

A day before the actual survey was started, the team would visit the place to see the Headman and other important persons, especially the school teacher if there is local School. In fact the teachers were the most cooperating units in this work. The students in that school were examined the same day to set a good precept of the type of working. Then, on the specified day, usually the next day, the survey of the village was started. The team moved from house to house and examined all the occupants.

Then following the recording of the name, age, sex and occupation, the undermentioned procedure was followed :

(i) Brief history.

(ii) Examination :—First visual acuity was checked with 'E' charts. Persons having visual acuity less than 6/9 were refracted. Effort was made to see the general improvement and the type of refractive error, whether myopic or hypermetropic.

(a) Inspection was done with naked eye and with corneal Loupe 10x.

(b) Visual axis was noted and cover test was performed.

(c) Fundus was examined through undilated pupil. If needed in a particular person, Drosyn 5% (Phenyl Ephrine) was employed to dilate the pupil.

(d) Intra ocular tension was taken digitally in the earlier part of the study, but later the tension was recorded with Schiotz tonometer using two weights and Scleral rigidity was taken into consideration from Friedenwalds, Nomogram (1955).

(e) Wherever needed Visual field was tested by confrontation method. Field charting is a difficult test to be performed on villagers.

Any person who needed more detailed study was referred to the base hospital.

#### **Recording of Data :—**

The findings of the surgeon were recorded in a proforma (appendix I). The pattern of recording was uniform. Those persons who were blind (economic), were also recorded in a separate proforma (appendix II) and coding (appendix III) was noted by the surgeon himself, after consulting the booklet, "Manual on the use of NSPB standard classification of causes of severe vision impairment and Blindness" Part II NSPB New York. (1966).

#### **Data analysis :—**

This part of the problem was a difficult job. To start with, the analysis was done on the pattern adopted by most of the workers, but it was changed later. The possible ways for analysis are as follows :—

(a) One method can be to divide the diseases eye-wise and then divide by '2' to get the number of persons. But the greatest flaw in this is that it gives false impression of prevalence rate e.g there are 50 cases having a disease in one eye only and 50 having bilateral disease ; then according to the method described, the diseased eyes are 150. Out of 200 eyes this makes ocular morbidity to be 75%, but otherwise taking the no. of patients the morbidity is 100% because all patients are affected though in 50% it is unilateral and in 50% bilateral.

(b) The second method takes into consideration the number of persons. In this let us say there are 100 cases, 10 are having bilateral immature cataract,



in 5 it is bilateral mature cataract, in 15 there is immature cataract in one eye only and in 10 one eye has immature cataract and the other eye has mature cataract. So the conclusion will be :—

|                         |             |       |
|-------------------------|-------------|-------|
| Total number of cases   | 100         |       |
| Immature cataract cases | $10+15+10=$ | 35    |
| mature cataract         | $5+10$      | =15   |
| Without any cataract    | 60          | =60   |
|                         |             | <hr/> |
|                         |             | =110  |

What has happened here is that immature and mature combined cases have overlapped. Instead of 40 persons, 50 persons appear to have cataract.

(c) to obviate this difficulty we have tried to analyse only patient wise and it was seen that no overlapping existed. The figures given in the example (b) are analysed as follows :—

#### Bilateral cataract

|                                 |    |
|---------------------------------|----|
| Bilateral immature cataract     | 10 |
| Bilateral Mature cataract       | 5  |
| One side mature other immature. | 10 |

#### Unilateral cataract

|                                              |       |
|----------------------------------------------|-------|
| Mature cataract One eye—Second eye aphakia   | 0     |
| " " " " — " " other than aphakia             | 0     |
| Immature cataract One eye—Second eye aphakia | 0     |
| " " " " — " " other than aphakia             | 15    |
| Total cataract cases                         | 40    |
| Normal                                       | 60    |
|                                              | <hr/> |
|                                              | =100  |

The general approach to analysis has been as follows :—

- Prevalence of disease in relation to age and sex.
- Bilateral and unilateral occurrence.
- Consideration of site type and aetiology.
- Inter-penetrating cohesive analysis.

Graphic representation has been utilised wherever needed to facilitate better comprehension of the tabulated data.

The main diseases are analysed irrespective of the other ocular pathologies existing. This would mean that a person having say e.g. cataract, corneal opacity and glaucoma combined is included only under one heading, whichever is earlier as assessed clinically, but in the discussion of respective diseases the same patient will come under all the headings.

For analysis the population examined is divided into decades and decade-wise percentage is taken out from the population examined in the respective decades. This is designated in the text as group population.

Main analysis was done under the guidance of trained and experienced statistician. Mostly 'Chi' square test was applied to find out the relative significance of various observations.

## Chapter II

### Population Analysis

Total number of persons examined in both the blocks is 12,743, out of which 6,687 are males and 6,056 females. Male—Female ratio is 1 : 0.9. In the general population of Punjab and Haryana the ratio is also 1 : 0.89. (table 3). In the various age groups the ratio of male—female examined and those distributed in the general population is slightly different. This may be due to the fact that available total population is broken up into 9 year age group while we have taken upto 10 Yr. age group. The second factor for this discrepancy seems to be due to the fact that the population figures taken up are projected figures over 1961 Census. The real figures may be different to a certain extent.

Distribution pattern of 1,000 persons is shown in table 4 and Fig. 2

DISTRIBUTION OF 1000 PERSONS OF EACH SEX

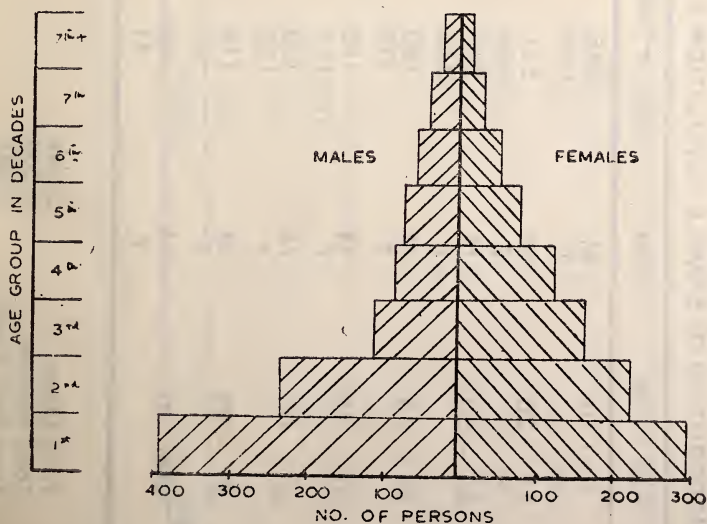


Fig. 2

Table III

## DISTRIBUTION OF SAMPLE POPULATION EXAMINED &amp; EVALUATED BY SEX &amp; AGE FOR EACH BLOCK

| Age Group          | Sex | Raipur Rani | Kharar | Belt Total | Belt Total M & F  |
|--------------------|-----|-------------|--------|------------|-------------------|
| 0 — 10             | M   | 955         | 1,668  | 2,623      | 4,447             |
|                    | F   | 659         | 1,165  | 1,824      |                   |
| 11 — 20            | M   | 521         | 1,020  | 1,541      | 2,899             |
|                    | F   | 458         | 900    | 1,358      |                   |
| 21 — 30            | M   | 255         | 467    | 722        | 1,741             |
|                    | F   | 348         | 671    | 1,019      |                   |
| 31 — 40            | M   | 180         | 373    | 553        | 1 314             |
|                    | F   | 310         | 451    | 761        |                   |
| 41 — 50            | M   | 185         | 306    | 491        | 972               |
|                    | F   | 177         | 304    | 481        |                   |
| 51 — 60            | M   | 133         | 226    | 359        | 686               |
|                    | F   | 123         | 204    | 327        |                   |
| 61 — 70            | M   | 110         | 140    | 250        | 448               |
|                    | F   | 87          | 111    | 198        |                   |
| Over 70            | M   | 59          | 89     | 148        | 236               |
|                    | F   | 41          | 47     | 88         |                   |
| Total Males :      |     |             |        |            | Ratio male/female |
| Total Females :    |     |             |        |            | 1 : 0.90          |
| Total Both Sexes : |     |             |        |            |                   |
| 2,398              |     |             |        |            | 6,687             |
| 2,203              |     |             |        |            | 6,056             |
| 4,601              |     |             |        |            | 12,743            |
| 5%                 |     |             |        |            |                   |
| 8%                 |     |             |        |            |                   |

**Table IV**

**DISTRIBUTION OF 1,000 PERSONS OF EACH SEX BY AGE GROUP**

| Age Group | Males        | Females      | Average      |
|-----------|--------------|--------------|--------------|
| 0 — 10    | 392          | 301          | 347          |
| 11 — 20   | 230          | 224          | 227          |
| 21 — 30   | 108          | 168          | 138          |
| 31 — 40   | 83           | 126          | 104          |
| 41 — 50   | 73           | 79           | 76           |
| 51 — 60   | 54           | 54           | 54           |
| 61 — 70   | 37           | 33           | 35           |
| Over 70   | 23           | 15           | 19           |
|           | <u>1,000</u> | <u>1,000</u> | <u>1,000</u> |



## Chapter III

### Visual Acuity

In 18.6% of the population examined it was not possible to examine visual acuity. The maximum number of these was in the first decade. In the other decades they were less common. In the first decade in 50.9% visual acuity could not be tested while in other decades the figures were 1.6%, 1.8%, 1.6%, 0.5%, 0.6%, 0.4% and 0% in the second, third, fourth, fifth, sixth, seventh decade and over seventh decade.

In total, 77.2% of the population has vision 6/6 and 6/9 in both the eyes ; in 6.1% one eye is normal (6/9 and 6/6) while other eye has vision less than 6/12. It is in 16.7% that both eyes showed vision less than 6/12. So the extent of ocular morbidity is 22.8% (Table V. : Fig. 3)

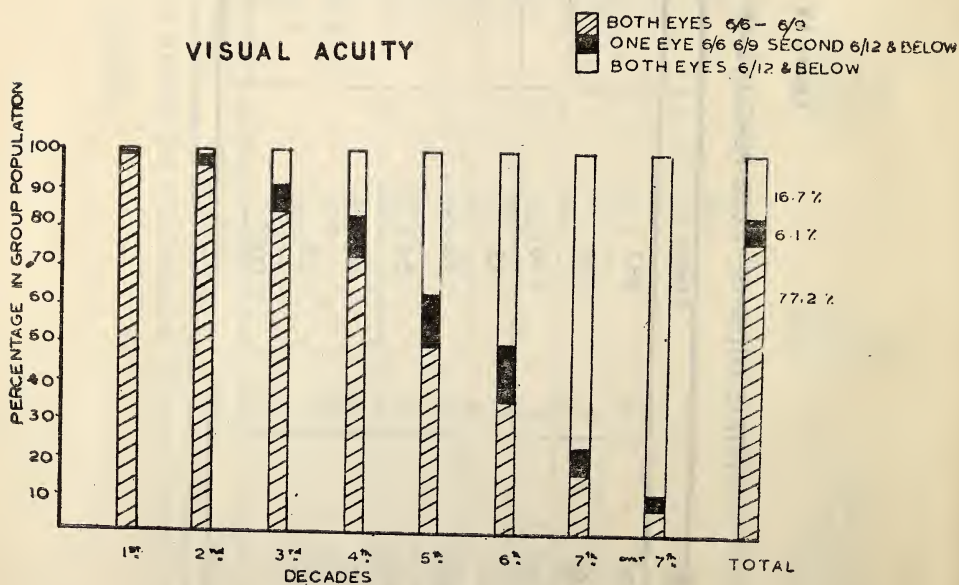


Fig. 3

In the first decade normal visual acuity in both eyes is present in 98.4%. Corresponding figures for other decades are 95.3%, 83.9%, 72.1%, 49.0%,

30.5%, 16.1%, 6.8% in 2nd, 3rd, 4th, 5th, 6th, 7th decade and beyond seventh decade. For 'both eyes abnormal' the figures are 0.5%, 1.9%, 9.4%, 16.3%, 37.9%, 55.2%, 70.6% and 89.4% for first, second, third, fourth, fifth, sixth, seventh decade and beyond seventh decade.

Thus in every 1000 persons 772 have perfectly normal vision while 228 have subnormal vision in one or both eyes. They either need refraction or other treatment. This speaks for the need of more production of ophthalmologists in the country to cope up with the huge burden of looking after these 125 million persons in the country having subnormal vision.

Table V

## VISUAL ACUITY

| Age Group | Total population examined | Both Eyes Normal Vision 6/6 & 6/9 |        |       | One Eye Normal 6/9 & 6/6, Second Eye below 6/12 |      |        | Both Eyes less than 6/12 |             |       | Not possible to examine vision |       |                                   |
|-----------|---------------------------|-----------------------------------|--------|-------|-------------------------------------------------|------|--------|--------------------------|-------------|-------|--------------------------------|-------|-----------------------------------|
|           |                           | Male                              | Female | Total | Per-centage                                     | Male | Female | Total                    | Per-centage | Male  | Female                         | Total | Total (% out of group population) |
| 0-10      | 4,447                     | 1,347                             | 801    | 2,148 | 98.4                                            | 15   | 9      | 24                       | 1.1         | 8     | 2                              | 10    | 0.5                               |
| 11-20     | 2,899                     | 1,436                             | 1,284  | 2,720 | 95.3                                            | 49   | 31     | 80                       | 2.8         | 26    | 26                             | 52    | 1.8                               |
| 21-30     | 1,741                     | 610                               | 824    | 1,434 | 83.9                                            | 49   | 66     | 115                      | 6.7         | 58    | 101                            | 159   | 9.3                               |
| 31-40     | 1,314                     | 425                               | 507    | 932   | 72.1                                            | 71   | 67     | 138                      | 10.6        | 52    | 170                            | 222   | 17.2                              |
| 41-50     | 972                       | 290                               | 184    | 474   | 49.0                                            | 75   | 52     | 127                      | 13.1        | 124   | 242                            | 366   | 37.8                              |
| 51-60     | 686                       | 138                               | 70     | 208   | 30.5                                            | 45   | 53     | 98                       | 14.3        | 174   | 202                            | 376   | 55.1                              |
| 61-70     | 448                       | 44                                | 27     | 71    | 15.9                                            | 22   | 9      | 31                       | 6.9         | 183   | 161                            | 344   | 77.1                              |
| Over 70   | 236                       | 9                                 | 7      | 16    | 6.8                                             | 7    | 2      | 9                        | 3.8         | 132   | 79                             | 211   | 89.4                              |
| Total     | 12,743                    | 4,299                             | 3,704  | 8,003 | 77.2                                            | 333  | 289    | 622                      | 6.0         | 757   | 933                            | 1,740 | 16.8                              |
|           |                           |                                   |        |       |                                                 |      |        |                          |             | 1,298 | 1,080                          |       | 2,378                             |
|           |                           |                                   |        |       |                                                 |      |        |                          |             |       |                                |       | 18.6                              |



## Chapter IV

### Refractive Error

(Patients of lenticular changes (clinically obvious) have not been included in this.)

5.132% of the general population have refractive error, 2.777% are myopic while 2.354% are hypermetropic.

In the male population refractive error is 4.306% (2.362% myopia and 1.944% hypermetropia) while in the female population this is 6.043% (3.236% myopia and 2.807% hypermetropia).

In the first decade general refractive error is 0.224% (0.112% myopia and 0.112% hypermetropia). In the second decade it is 2.93% (myopia 2% and hypermetropia 0.93%). In the third decade it is 8.67% (5.858% myopia and 2.814% hypermetropia). In the fourth decade it is 11.18% (4.946% myopia and 6.316% hypermetropia). In the fifth decade it is 14.19% (5.658% myopia and 8.539% hypermetropia). In the sixth decade 11.51% (6.70% myopia and 4.8% hypermetropia). In the seventh decade 8.30% (3.571% myopia and 4.464% hypermetropia). Over seventh decade it is 3.82% (2.966% myopia and 0.847% hypermetropia).

Thus myopia shows a progressive rise upto 3rd decade, then it falls and rises again to maximum in the 6th decade, then falls again beyond it. Hypermetropia on the other hand shows a peak in the 5th decade and so its rise corresponds to fall in myopia. The overall incidence of general refractive change being maximum at this stage.

In the first decade myopia and hypermetropia is same, then myopia far over shoots hypermetropia in 2nd & 3rd decade. In the 4th decade hypermetropia suddenly shoots up from 2.814% to 6.316% and myopia shows a fall in this decade. When myopia reaches second peak of 6.70% in the sixth decade, hypermetropia shows a fall from 8.539% to 4.8%. After that both show a fall though hypermetropia is on the higher side. Beyond seventh decade situation is almost akin to second decade, where myopia is more than hypermetropia (Fig 4).



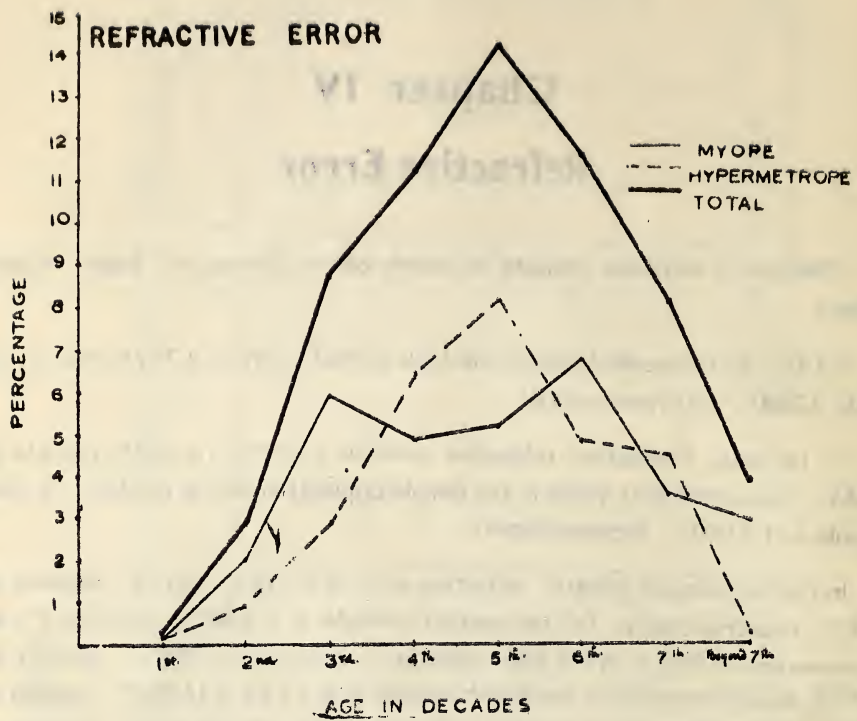


Fig. 4

The figures arrived at by Aggarwal (1967) as compared with ours show remarkable difference in all the decades,

| Age      | Ours   |        |         | Aggarwal |         |         |
|----------|--------|--------|---------|----------|---------|---------|
|          | Myp.   | Hyp.   | Total   | Myp.     | Hyp.    | Total   |
| 0—10     | 0.112% | 0.112% | 0.224%  | 1.932%   | 2.534%  | 4.466%  |
| 11—20    | 2.000% | 0.930% | 2.930%  | 7.275%   | 10.022% | 17.297% |
| 21—30    | 5.858% | 2.814% | 8.670%  | 7.919%   | 10.348% | 18.267% |
| 31—40    | 4.946% | 6.316% | 11.260% | 9.298%   | 22.456% | 31.754% |
| 41—50    | 4.658% | 8.539% | 14.190% | 11.414%  | 29.776% | 41.190% |
| 51—60    | 6.700% | 4.800% | 11.510% | 9.345%   | 23.670% | 33.021% |
| 61—70    | 3.571% | 4.464% | 8.030%  | 19.827%  | 25.000% | 44.820% |
| Above 70 | 2.966% | 0.847% | 3.820%  | 20.512%  | 12.820% | 33.332% |

From this it appears that from 3rd to 6th decade the stabilising effect of various variable normal eye components is in a most reshuffling period, though in general, changes continue occurring throughout life. The components that continue affecting refractive state of the eye are cornea and lens. Although Sorsby et al (1967) obtained a close agreement between measurements of the dimensions of the eye as furnished by optical and radiological methods respectively. Goldmann and Hogen's (1942) radiological studies failed to disclose any evidence for a senile variation of corneal refraction. The general lens flattening with age is fully established, but it can be due to either mechanical zonular tension (Weale 1963) or, organizational (Sorsby 1957). Brown's (1938) longitudinal study shows that hypermetropia increased until 7th year of life, this was confirmed by Slatapar (1950). Refraction was found to increase between 8-13 years, but this tendency slowed down in the late teens. An increase in the myopia was noticed between 20-33 years and refraction to weaken during following ten years. This tendency was reversed in 6th decade. Slatapar's data are in agreement with Brown (1938) and his data cover a higher age range. He found hypermetropia to increase upto middle of 7th decade and after which the average eye becomes more myopic.

We cannot comment on the very early age groups as in a survey study atropine refractions are not possible, but slowing down tendency in late teens as observed by Brown is not seen in this. The findings of increase in myopia from 20-33 and then weakening as observed by Brown, is quite evident from the graph.

The findings do not concur with the data of Slatapar, who noticed that there is an increase in hypermetropia upto the 7th decade and then myopia is more. We notice this to be maximum in the 5th decade and then myopia takes over. These differences are obviously due to the difference of the material. The factors playing part in this may be either racial or environmental.

Parson (1906) pointed out that senile eye becomes more hypermetropic because of increase in the refractive index of the cortex. The evidence presented so far has not proved this contention. Human lens appears to have constant refractive index (Weale 1963). Smith (1883) held the decreasing curvature of the lens to be responsible for the senile hypermetropia. Alexander (1921) however felt that increasing radii of curvature of lens surface and those of nucleus are responsible for these changes. Thus elderly myopia may be either due to pathological change in refractive index (Slatapar 1950) or to be an actual senile decrease in size of nucleus. The progressive hypermetropia is probably due to growth of the lens (Weale 1963).

**Table VI**  
REFRACTIVE ERROR

| Age      | Total  |     | Myopia |     | Hypermetropia |       | Group Percent-<br>age out of myop-ic cases |     | Group %age out of Hyper-metropic patients |       | All types |     | Group %age |     | Percent age |       |
|----------|--------|-----|--------|-----|---------------|-------|--------------------------------------------|-----|-------------------------------------------|-------|-----------|-----|------------|-----|-------------|-------|
|          | M      | F   | M      | F   | M             | F     | T                                          | T   | M                                         | F     | F         | T   | M          | T   | age         | age   |
| 1-10     | 447    | 4   | 1      | 5   | 0.112         | 1.41  | 3                                          | 2   | 5                                         | 0.112 | 1.66      | 7   | 3          | 10  | 0.224       | 1.52  |
| 11-20    | 2899   | 32  | 26     | 58  | 2.000         | 16.38 | 21                                         | 5   | 26                                        | 0.93  | 8.66      | 53  | 31         | 84  | 2.93        | 12.85 |
| 21-30    | 1741   | 29  | 73     | 102 | 5.858         | 28.82 | 16                                         | 33  | 49                                        | 2.814 | 16.34     | 45  | 106        | 151 | 8.67        | 23.10 |
| 31-40    | 1314   | 26  | 39     | 65  | 4.946         | 18.36 | 26                                         | 56  | 82                                        | 6.316 | 27.34     | 52  | 95         | 147 | 11.18       | 22.48 |
| 41-50    | 972    | 25  | 30     | 55  | 5.658         | 15.54 | 38                                         | 45  | 83                                        | 8.539 | 27.66     | 63  | 75         | 138 | 14.19       | 21.11 |
| 51-60    | 686    | 27  | 19     | 46  | 6.700         | 12.99 | 13                                         | 20  | 33                                        | 4.800 | 11.10     | 40  | 39         | 79  | 11.51       | 12.07 |
| 61-70    | 448    | 11  | 5      | 16  | 3.571         | 4.52  | 12                                         | 8   | 20                                        | 4.464 | 6.66      | 23  | 13         | 36  | 8.03        | 5.51  |
| Above 70 | 236    | 4   | 3      | 7   | 2.966         | 1.98  | 1                                          | 1   | 2                                         | 0.847 | 0.67      | 5   | 4          | 9   | 3.82        | 1.36  |
| Total    | 12743  | 158 | 196    | 354 | 100%          | 130   | 170                                        | 300 | 100%                                      | 288   | 366       | 654 | 100%       |     |             | 100%  |
|          | 2.362% |     | 3.236% |     | 2.777%        |       | 1.944%                                     |     | 2.807%                                    |       | 2.354%    |     | 4.306%     |     | 5.132%      |       |



## Chapter V

### Blindness

The term blindness has been variously defined from time to time. It is only lately that from confused concepts a clear definition has emerged. Parsons defined blindness as too blind to perform work for which eye sight is essential. In this statement there is no scientific landmark with which to measure the blindness. In U. K. the criteria of blindness is a vision of 3/60 or less. The model reporting area for Blindness statistics under the sponsorship of National Institute of Neurological diseases and blindness of the Public Health Service America in 1962 defined it as 'visual acuity for distant vision of 6/60 and less in better eye with best correction or visual acuity of more than 6/60 but with widest diameter of the field of vision not greater than 20°'. This has been accepted as a standard definition. Franken et al (1968) surveyed the dry belt of Punjab with these specifications.

Many other reports available, however, have labelled different criteria e. g. F.C. 3 meters (Shukla-65, Ghosh 69) or vision 1/60 (Venkataswamy-1961). In this survey the criteria of blindness of N.S.P.B. (U.S.A.) 1966 was adopted.

#### Prevalence of Blindness :

Based on the total population of the two blocks comprising of 12743 persons of all age groups, the prevalence of blindness was 3.2% as against 2.02% reported by Franken-et-al, 1.98% Aggarwal et-al (1966) and 2.2% in two villages reported by the same author and 2.5% (Ghosh et-al).

#### Blindness rate : (Table VII)

Blindness rate is defined as number of blind persons per lakh of population. The blindness rate reported in various places is as follows :

Canada—131

U. S. A.—214

U. K. —200

India :—

(by Trachoma Pilot Project) 1000

Aggarwal-et-al 1967—2240 (Incurable 880)

Franken et-al, 1968—(In dry belt of Punjab)—2022

Our Study —3200



This 3.2% encountered in survey is different as compared to blindness rate obtained from Hospital attending Population. In 35000 cases so analysed this was found to be 5.8% as against 26.2% reported by Shukla (1965).

Out of these 3200 blind, per one lakh population (Table VII) 972 were incurable blind and 2228 curable blind, thus making the curability rate 69.6%. This rate varies from place to place and depends upon the attitude of people and medical facilities available. In Kharar Block this rate is 65.8% while in Raipur Rani block it is 73.8%. These different prevalence figures indicate the need of medical facilities more at one place as compared to the other. The figures are 56.25% in Rajiwin village found by Delhi group of workers.

### BLINDNESS (PREVENTABLE & CURABLE)

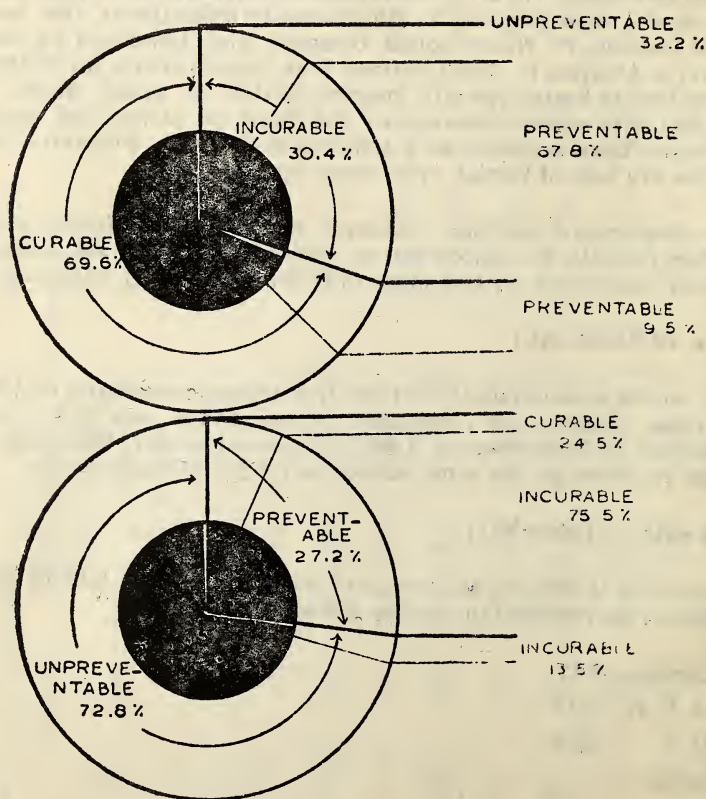


Fig. 5

In general, (fig.5), amongst this curable blindness only 9.5% is preventable as compared to 67.8% in the incurable blind series. Preventibility of curable

blindness is 13.1% for Kharar and 6.2% for Raipur Rani. This difference is due to cataract and corneal opacities. The former being more common in Raipur Rani block and the latter being more in Kharar block. The preventability of incurable blindness is 65.3% in Kharar Block, while it is 71.2% in Raipur Rani block. Though the need for general preventability in both the blocks is considerable, it is still more for Raipur Rani block. This is due to cases of multiple affections e. g., (cataract in combination and glaucoma in combination) in Raipur Rani Block. It again speaks for the need of more medical facilities as well as awareness among the people. In every one lakh of population, 3200 persons are blind in this area. Out of this 2228 are curable and they need medical attention while 972 need rehabilitation. Out of total blind 870 blind per lakh could have been prevented while 2330 have unpreventable diseases. Amongst the former 870, only 212 can be cured now while 2228 in the latter group can be cured. Thus 102 have gone blind just for lack of medical help in latter group and 658 in the former group.

Taken age-wise, in the first age group blindness is 1/2 curable unpreventable and 1/2 preventable incurable. So whole of it is either curable or preventable (Table VIII). In the second decade it is unpreventable incurable. In the third decade curable and incurable is in 1 : 1.75 ratio, while the ratio of preventable unpreventable is 1 : 0.83.

In the fourth decade curable and incurable is 1 : 1 ; while preventable and unpreventable is 1 : 0.86.

In the fifth decade curable : incurable ratio is 1 : 0.44 while preventable : unpreventable is 1 : 2.82.

In the sixth decade ratio of curable and incurable blindness is 1 : 0.48 while preventable and unpreventable is 1 : 2.30.

In the 7th decade the ratio of curable and incurable is 1 : 0.3 and the preventable and unpreventable is 1 : 4.04.

Beyond 7th decade the ratio of curable and incurable is 1 : 0.34 while preventable and unpreventable is as 1 : 3.53 roughly.

Taking in terms of total blindness, curable : incurable is 1 : 0.44 and preventable and unpreventable as 1 : 2.67. So while 1/2 of the blindness is incurable, about 1/3rd is preventable. The percentage in curable blindness in various age groups is as follows :—

0.018% in the 1st decade, 0.233% in the third, 1.066% in the 4th decade, 4.623% in the 5th decade, 9.766% in the 6th decade, 19.844% in the 7th decade, and over 7th decade it is 27.538%. Figures for incurable blindness in the corresponding age groups are 0.022%, 0.034%, 0.402%, 1.066%, 2.057%, 4.664%, 6.026%, and 9.322%. Further splitting of these sex-wise reveals (Table IX) that in the male population incurable male blind are 0.038% in the 1st decade, 0.554% in the third decade, 0.362% in the 4th decade, 2.037% in the fifth decade, 4.457% in the 6th decade, 5.200% in the 7th decade and 10.136% over 7th decade. The figures for females are 0.074% in the second, decade and for subsequent corresponding decades these are 0.294%, 1.577%

2.079%, 4.893%, 7.071% and 7.955%. Though the figures for males and females do not show any significant difference except in the 4th decade, the corresponding figures for the curable blindness are towards higher side in the females.

### Age-Vs-Site Type ; (Table X & XI)

The economic blindness considered agewise shows a progressive rise from 1st decade onwards, there being only small fall from first decade to 2nd (from 0.04% & 0.03%). From 3rd decade onwards this percentage in respective age groups population is 0.634%, 2.13%, 6.68%, 14.43%, 25.89%, 36.44%, in 3rd, 4th, 5th, 6th, 7th decade and onwards. [Fig. 6]

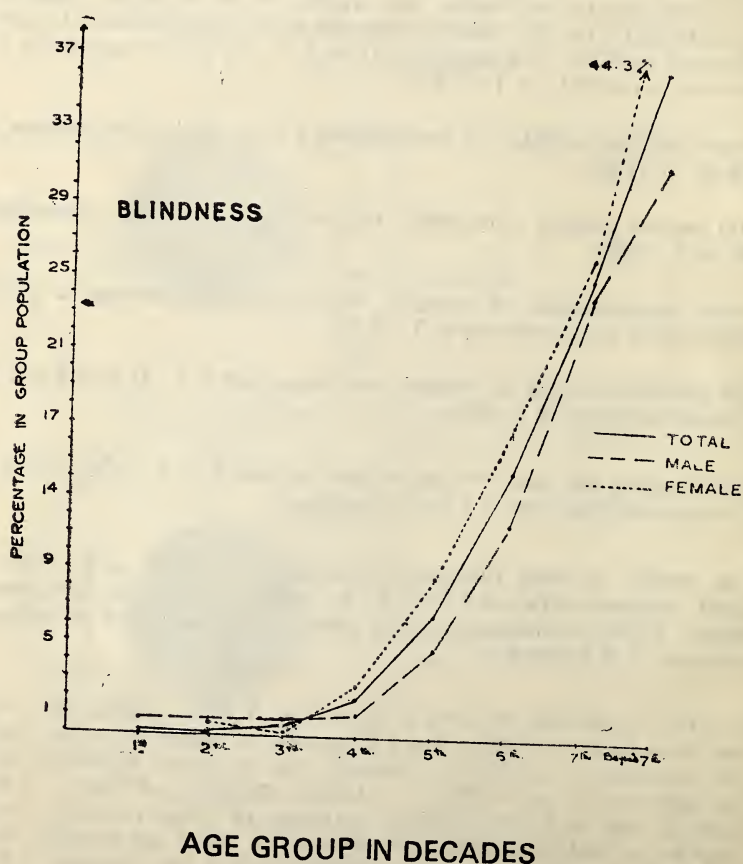


Fig. 6



Table VIII

| Age group | CURABLE          |                    |       |        | INCURABLE        |                    |       |        | RATIO                       |        |                             |                                   |
|-----------|------------------|--------------------|-------|--------|------------------|--------------------|-------|--------|-----------------------------|--------|-----------------------------|-----------------------------------|
|           | Preven-<br>table | Unpre-<br>ventable | Total | %age   | Prevent-<br>able | Unpre-<br>ventable | Total | %age   | Grand<br>total all<br>types | %age   | Curable :<br>Incur-<br>able | Preventable<br>Unpreven-<br>table |
|           | ...              | 1                  | 1     | 0.018  | 1                | ...                | 1     | 0.022  | 2                           | 0.040  | 1:1                         | 1 : 1                             |
| 0-10      | ...              | ...                | ...   | ...    | ...              | 1                  | 1     | 0.034  | 1                           | 0.030  | 0:1                         | C : 1                             |
| 11-20     | ...              | ...                | ...   | ...    | ...              | 1                  | 1     | 0.034  | 1                           | 0.030  | 0:1                         | C : 1                             |
| 21-30     | 1                | 3                  | 4     | 0.238  | 5                | 2                  | 7     | 0.402  | 11                          | 0.640  | 1 : 1.75                    | 1 : 0.83                          |
| 31-40     | 4                | 10                 | 14    | 1.066  | 11               | 3                  | 14    | 1.066  | 28                          | 2.130  | 1 : 1                       | 1 : 0.86                          |
| 41-50     | 5                | 40                 | 45    | 4.623  | 12               | 8                  | 20    | 2.057  | 65                          | 6.680  | 1 : 0.44                    | 1 : 2.82                          |
| 51-60     | 7                | 60                 | 67    | 9.766  | 23               | 9                  | 32    | 4.664  | 99                          | 14.430 | 1 : 0.48                    | 1 : 2.30                          |
| 61-70     | 5                | 84                 | 89    | 19.844 | 18               | 9                  | 27    | 6.026  | 116                         | 25.890 | 1 : 0.30                    | 1 : 4.04                          |
| Above 70  | 5                | 59                 | 64    | 27.538 | 14               | 8                  | 22    | 9.322  | 86                          | 36.860 | 1 : 0.34                    | 1 : 3.53                          |
| Total     | 27               | 257                | 284   | 2.230% | 84               | 40                 | 124   | 0.9700 | 408                         | 3.200  |                             |                                   |
|           | 9.51%            | 90.49%             |       |        | 67.74%           | 32.26%             |       |        |                             |        |                             |                                   |



In the male population this percentage in various age group is as follows :—

0.076%, 0.831% 1.084%, 4.684%, 11.977%, 2.480%, 31.75% in the first, third, fourth, fifth, sixth, seventh, and over seventh decade respectively. In the females the same figures are 0.074%, 0.49 %, 2.890%, 8.731%, 17.125%, 27.27% and 44.318% in 2nd, 3rd, 4th, 5th, 6th, 7th decade and over 7th decade. Thus in the first decade only males were encountered and in the second decade only females. From third decade onwards males and females show a progressive rise. In the third decade male population is more involved, otherwise in all the decades it is the female population which is more affected.

Amongst those blind encountered in the first decade, 1/2 are blind due to phthisis bulbi and half due to diseases of lens. In the second decade it was optic atrophy following meningitis which was encountered in all. In the third decade, lens diseases constituted 36.3%, corneal scleral diseases 36.3% and general eyeball diseases 27.4%. In "general eyeball diseases". phthisis bulbi was in 2/3rd cases while myopic blindness in 1/3rd cases. In the 4th decade, "general eyeball diseases" (male : female 1:3) constituted 14.3%, cornea sclera (male : females 1:3) diseases 46.4%, lens (male:female-1 : 9) in 35.7% and site type indefinite (multiple affecticns) 3.6%. In the "eye ball diseases" 1/2 were due to phthisis bulbi and 1/2 due to glaucoma.

In the fifth decade, "eyeball diseases" were in 1.5%, cornea sclera diseases (male : female-1 : 1.4) in 26.1%, lens diseases (male female-1 : 2.5 in 60.4%, optic atrophy in 1.5%, site type indefinite (male : female : 1 : 0.7) in 10.5% (cataract in combination in about 70% and glaucoma in combination in about 30%). in the 6th decade, atrophic globe constituted 1%, corneal opacity (males : female - 1 : 1) 25%, lens diseases 62% (male : females - 1 : 1.5), macular degeneration 1%, site type indefinite (males : females - 1 : 1.5 in 10%. (3/5th having cataract in combination : 1/5th glaucoma in combination and rest 1/5th indefinite).

In the 7th decade, atrophic globe 0.8%, corneal opacities (male : female 1 : 0.9) 12.9%, lens diseases (male : female - 1 : 0.9) 75.2%, optic atrophy 0.8% and site type indefinite (male : female - 1 : 1.4) 10.3% (.glaucoma in combination 9.8% & cataract in combination 90.2%).

Beyond 7th decade, eyeball diseases 2.3% (atrophic globe and glaucoma 1 : 1) corneal opacity (male : female - 1 : 0.6) 16.2%, lens (male : female 1 : 0.9) in 68.8%, and "site type indefinite" (male : female - 1 : 1.8) in 12.7% (cataract in combination 63.6%, glaucoma in combination in 18.2% and undecided in 18.2%).

The various figures reported of blindness distribution in various age groups are as follows:

**Table XII**

| Age group | Arnold Sorsby Madras Cen-<br>(England) | sus Depart-<br>ment | Franken<br>(Ludhiana)<br>Punjab | Our findings | Aggarwal<br>(1967) |
|-----------|----------------------------------------|---------------------|---------------------------------|--------------|--------------------|
| 0-20      | 3.4%                                   | 20.6%               | 20.6%                           | 0.73%        | 2.96%              |
| 21-30     | 1.2%                                   | 7.9 %               | 5.6%                            | 2.69%        | 2.96%              |
| 31-60     | 12.2%                                  | 45.8%               | 38.9%                           | 46.56%       | 62.23%             |
| Above 60  | 83.0%                                  | 25.6%               | 34.9%                           | 49.99%       | 31.85%             |

**Table IX**  
**CURABLE AND INCURABLE PATIENTS BY AGE AND SEX**

| Age Group | CURABLE |                         |         |                           | INCURABLE |                         |         |                           |
|-----------|---------|-------------------------|---------|---------------------------|-----------|-------------------------|---------|---------------------------|
|           | Male    | Group %age out of males | Females | Group %age out of Females | Male      | Group %age out of Males | Females | Group %age out of Females |
| 0-10      | 1       | 0.038                   | ...     | ...                       | 1         | 0.038                   | ...     | ...                       |
| 11-20     | ...     | ...                     | ...     | ...                       | ...       | ...                     | 1       | 0.074                     |
| 21-30     | 2       | 0.277                   | 2       | 0.196                     | 4         | 0.554                   | 3       | 0.294                     |
| 31-40     | 4       | 0.723                   | 10      | 1.314                     | 2         | 0.362                   | 12      | 1.577                     |
| 41-50     | 13      | 2.648                   | 32      | 6.652                     | 10        | 2.037                   | 10      | 2.079                     |
| 51-60     | 27      | 7.520                   | 40      | 12.232                    | 16        | 4.457                   | 16      | 4.893                     |
| 61-70     | 49      | 19.600                  | 40      | 20.202                    | 13        | 5.200                   | 14      | 7.071                     |
| Over 70   | 32      | 21.621                  | 32      | 36.363                    | 15        | 10.135                  | 7       | 7.955                     |
| Total     | 128     |                         | 156     |                           | 61        |                         | 63      |                           |

Table X

## BILATERAL BLINDNESS

| Age Group | Male blind | %age male blind in male population | Female blind | %age female blind in female population | Total blind | Total blind per 1000 | Male : Female | %age of total group population | Eye ball in general | Cornea | Sclera | Lens | Retina | Optic Nerve | Site Type Indefinite |
|-----------|------------|------------------------------------|--------------|----------------------------------------|-------------|----------------------|---------------|--------------------------------|---------------------|--------|--------|------|--------|-------------|----------------------|
| 0—10      | 2          | 0.076                              | —            | —                                      | 2           | 5                    | 2:0           | 0.045                          | 1                   | —      | —      | 1    | —      | —           | —                    |
| 11—20     | —          | —                                  | 1            | 0.074                                  | 1           | 2                    | 0:2           | 0.034                          | 50%                 | —      | —      | 50%  | —      | 1           | —                    |
| 21—30     | 6          | 0.831                              | 5            | 0.490                                  | 11          | 27                   | 15:12         | 0.632                          | 3                   | 4      | 4      | 4    | —      | —           | —                    |
| 31—40     | 6          | 1.084                              | 22           | 2.890                                  | 28          | 69                   | 15:54         | 2.131                          | 4                   | 13     | 10     | —    | —      | —           | 1                    |
| 41—50     | 23         | 4.684                              | 42           | 8.731                                  | 65          | 159                  | 56:103        | 6.687                          | 1                   | 17     | 39     | —    | —      | 1           | 7                    |
| 51—60     | 43         | 11.977                             | 56           | 17.125                                 | 99          | 243                  | 105:138       | 14.431                         | 1                   | 25     | 62     | 1    | —      | —           | 10                   |
| 61—70     | 62         | 24.800                             | 54           | 27.27                                  | 116         | 284                  | 151:133       | 25.893                         | 1                   | 15     | 87     | —    | —      | 1           | 12                   |
| Over 70   | 47         | 31.756                             | 39           | 44.318                                 | 86          | 211                  | 115.96        | 36.441                         | 2                   | 14     | 59     | —    | —      | —           | 11                   |
|           |            |                                    |              |                                        |             |                      |               |                                | 2.3%                | 16.2%  | 68.8%  |      |        |             | 12.7%                |
| Total :   | 189        | 219                                | 408          | 1,000                                  | 462:538     | 3,202                | 13            | 88                             | 262                 | 1      | 3      | 41   |        |             |                      |
|           | 46.3%      | 2.826                              | 53.7%        | 3.161                                  |             |                      |               |                                | 3.1%                | 21.5%  | 64.5%  | 0.2% | 0.7%   | 10.0%       |                      |



Table XI

## BILATERAL BLINDNESS

| Age & sex-wise Aetiology | Eyeball in General |           |           | Cornea — Sclera |           |           | Lens      |           |           | Retina Optic Nerve |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
|--------------------------|--------------------|-----------|-----------|-----------------|-----------|-----------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---|---|---|--|
|                          | 111-99.00          | 111-91.00 | 113-91.00 | 140-99.00       | 145-29.20 | 155-31.09 | 155-20.20 | 155-22.00 | 155-28.20 | 155-22.00          | 310-22.00 | 315-22.00 | 318-29.20 | 318-28.20 | 390-91.00 | 390-28.20 | 390-29.20 | 390-22.00 | 340-80.20 | 411-62.21 | 411-80.20 | 411-18.00 | 412-62.21 | 412-62.22 | 412-37.08 | 412-37.18 | 412-37.19 | 420-38.08 | 660-62.21 | 720-62.21 | 720-29.20 | 720-99.00 |   |   |   |  |
| 0-10 M                   |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 0-10 F                   |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 11-20 M                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 11-20 F                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 21-30 M                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 21-30 F                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 31-40 M                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 31-40 F                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 41-50 M                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 41-50 F                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 51-60 M                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 51-60 F                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 61-70 M                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| 61-70 F                  |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| Above 70 M               |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| Above 70 F               |                    |           |           |                 |           |           |           |           |           |                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |   |   |   |  |
| Total M                  | 1                  | 1         | 1         | 1               | 1         | 1         | 1         | 1         | 1         | 1                  | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1 | 1 | 1 |  |
| Total F                  | 1                  | 1         | 1         | 1               | 1         | 1         | 1         | 1         | 1         | 1                  | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1 | 1 | 1 |  |

Continued on Page 26



Table XI

SITE — TYPE INDEFINITE

| Age group       | 951—99.00 | 951—95.02 | 951—91.00 | 955—91.00 | 956—95.00 | 956—62.22 | 956—22.00 | 956—62.21 | 956—91.00 | 956—28.20 | 956—29.20 | 990—99.00 | 956—95.99 | TOTAL   | Grand Total |
|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|-------------|
| 0—10 M<br>F     |           |           |           |           |           |           |           |           |           |           |           |           |           | M F     | 2           |
| 11—20 M<br>F    |           |           |           |           |           |           |           |           |           |           |           |           |           | 1 1     | 1           |
| 21—30 M<br>F    |           |           |           |           |           |           |           |           |           |           |           |           |           | 6 5     | 11          |
| 31—40 M<br>F    |           |           |           |           |           |           |           |           |           |           | 1         |           |           | 6 22    | 28          |
| 41—50 M<br>F    |           |           | 1         | 1         |           |           | 1 1       |           |           |           |           |           | 2 1       | 23 42   | 65          |
| 51—60 M<br>F    |           |           | 2         |           |           | 1         |           |           |           | 1         |           | 2         | 3 1       | 43 56   | 99          |
| 61—70 M<br>F    |           | 1         |           |           | 2 2       |           |           | 1         |           | 2         |           |           | 2 2       | 62 54   | 116         |
| Above 70 M<br>F | 1         | 1         |           |           |           | 1         | 1         | 1         | 1         |           |           | 1 1       | 3         | 47 39   | 86          |
| Total M<br>F    | 1         | 2         | 3         | 1         | 2 2       | 2         | 1 2       | 1 1       | 1         | 1 2       | 1         | 1 3       | 7 7       | 189 219 | 408         |

For comparison further analysis of figure of blindness are available from contemporary workers. Most of the reports are based on hospital studies or camps and these being biased studies cannot be taken for comparison.

Taken in terms of group population in each group, our figures are at variance with Ludhiana report in the dry belt of Punjab. The distribution pattern reported by Aggarwal (1967) are some-what similar to our observations, differences are mainly in the 2nd and 5th decades. The figures are compared in table 6.

**Table XIII**

| Age group         | Franken | Our findings | Aggarwal 1967 |
|-------------------|---------|--------------|---------------|
| 1st decade        | 0.679%  | 0.04%        | 0.044%        |
| 2nd decade        | 0.911%  | 0.03%        | 0.220%        |
| 3rd decade        | 0.765%  | 0.64%        | 0.420%        |
| 4th decade        | 1.094%  | 2.13%        | 1.750%        |
| 5th decade        | 2.971%  | 6.68%        | 3.72%         |
| 6th decade        | 7.162%  | 14.13%       | 18.380%       |
| Beyond 6th decade | 11.815% | 29.53%       | 27.740%       |
| Total Blind       | 2.022%  | 3.2%         | 2.24%         |

%age amongst total group population in respective, age groups.

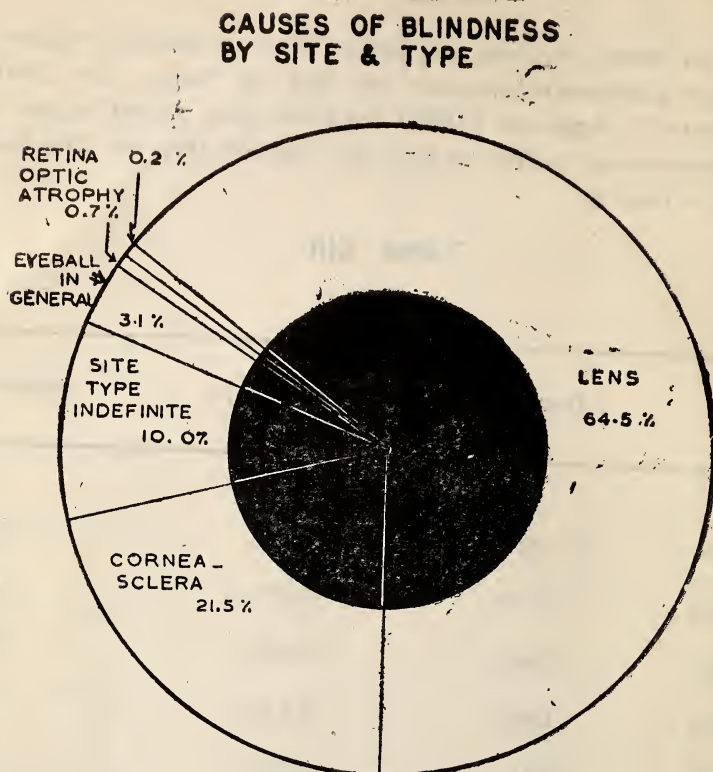


Fig. 7

The lenticular affections ranked first i. e. 64.2%. Then in order of frequency were corneal diseases 21.5%, site type indefinite (90.4% being multiple affections) 10%, eyeball diseases (glaucoma, myopia and phthisis bulbi) 3.1%, optic atrophy 0.7% and macular degeneration in 0.3%.

Lens was responsible for all blindness in 38.82% as reported by Franken et al. These authors reported that cornea constituted 37.8%, eyeball in general 17.01%, retina 3.05%, optic nerve 1.01% and site type indefinite in 2.31%, of the total blind encountered. Leucoma is reported as responsible for 17.1% blind in Poland (Rostkowski 1965)

While glaucoma as a cause of blindness is reported by Franken-et-al in dry belt of Punjab as 11.68%, in our series it was 1.2% as such and 2.0% in combination (3.2% total). In Raipur Rani block these figures were 0.5% (total) while in Kharar Block 2% and 3.9% (5.9% total). In North Caroline (USA) galucomatous blindness is reported in 15.2% while "McDonald (1965, put it at 23% in Canada, (gloucoma and myopia combined). In Poland, Rostkowski reported this as 12.1%





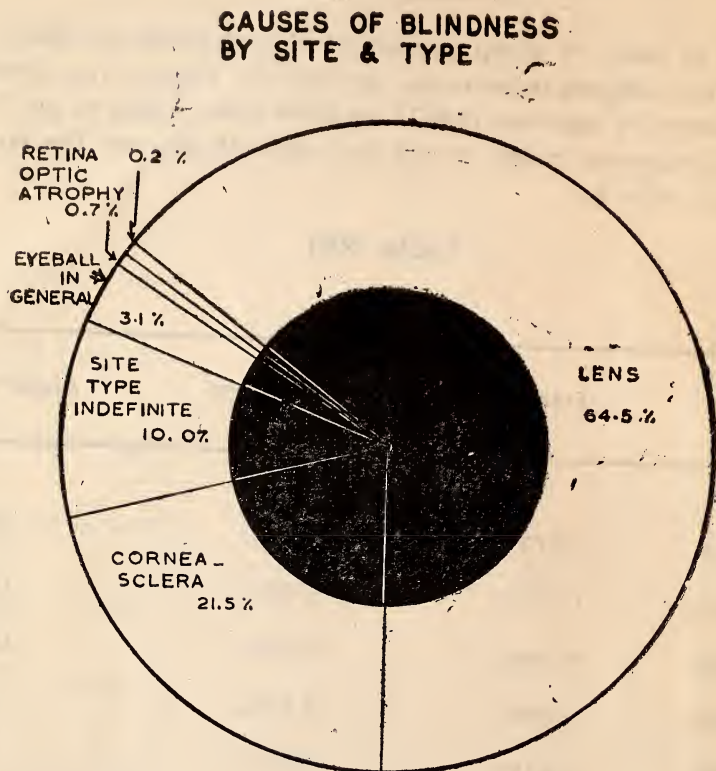


Fig. 7

The lenticular affections ranked first, i. e. 64.2%. Then in order of frequency were corneal diseases 21.5%, site type indefinite (90.4% being multiple affections) 10%, eyeball diseases (glaucoma, myopia and phthisis bulbi) 3.1%, optic atrophy 0.7% and macular degeneration in 0.3%.

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Table XIV  
BILATERAL BLINDNESS  
BY SITE-TYPE AND AETIOLOGY

|                                   | All Cases by Site Type | EYE BALL IN GENERAL | 111 Glaucoma-Open Angle | 113 Glaucoma-Not Specified | 140 Myopia | 155 Atrophic Globe | CORNEA SCLERA | 318 Other Keratitis | 310 Kerato-Conjunctivitis | 340 Other Corneal Dystrophy | 315 Trachoma | 390 Other Affections | LEN S         | 411 Cataract Unoperated | 412 Cataract Operated | 420 Dislocated Lens | RETINA   | 660 Macular Degeneration | OPTIC PATHWAYS | 720 Optic Atrophy | SITE-TYPE INDEFINITE | 955 Glaucoma in combination | 951 Glaucoma and Cataract | 956 Cataract in any other combination | 990 Site-Type not established |
|-----------------------------------|------------------------|---------------------|-------------------------|----------------------------|------------|--------------------|---------------|---------------------|---------------------------|-----------------------------|--------------|----------------------|---------------|-------------------------|-----------------------|---------------------|----------|--------------------------|----------------|-------------------|----------------------|-----------------------------|---------------------------|---------------------------------------|-------------------------------|
| All cases by Aetiology .          | 408<br>(3200)          | 13<br>(101)         | 3<br>(23)               | 2<br>(16)                  | 1<br>(8)   | 7<br>(54)          | 88<br>(690)   | 18<br>(142)         | 26<br>(204)               | 1<br>(8)                    | 7<br>(64)    | 36<br>(282)          | 262<br>(2056) | 247<br>(1937)           | 14<br>(112)           | 1<br>(8)            | 1<br>(8) | 1<br>(8)                 | 3<br>(24)      | 3<br>(24)         | 41<br>(321)          | 2<br>(16)                   | 6<br>(46)                 | 29<br>(227)                           | 4<br>(327)                    |
| Infectious Diseases .             | 101<br>(792)           | 6                   | ..                      | ..                         | ..         | 6<br>(46)          | 86<br>(674)   | ..                  | ..                        | ..                          | ..           | ..                   | 1             | ..                      | ..                    | ..                  | ..       | ..                       | 1              | ..                | 7<br>(54)            | ..                          | ..                        | ..                                    | ..                            |
| 18.00                             | 1 (8)                  | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 1 (8)         | 1                       | ..                    | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 20.20                             | 1 (8)                  | 1                   | ..                      | ..                         | ..         | 1                  | 48            | ..                  | ..                        | ..                          | ..           | ..                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 22.00                             | 52<br>(407)            | ..                  | ..                      | ..                         | ..         | 8<br>(8)           | 376           | ..                  | 26                        | ..                          | 7            | 15                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | 3 (23)               | ..                          | ..                        | 3                                     | ..                            |
| 23.20                             | 12<br>(94)             | 1                   | ..                      | ..                         | ..         | 7<br>(8)           | ..            | 3                   | ..                        | ..                          | ..           | 4                    | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | 3 (23)               | ..                          | ..                        | 3                                     | ..                            |
| 29.20                             | 35<br>(275)            | 2                   | ..                      | ..                         | ..         | 16<br>(6)          | 31<br>(241)   | 15                  | ..                        | ..                          | ..           | 16                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | 1 (8)                | ..                          | ..                        | 1                                     | ..                            |
| Injuries & Poisonings .           | 5<br>(39)              | 1                   | ..                      | ..                         | ..         | 1 (8)              | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 4             | ..                      | 3                     | 1                   | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 31.09                             | 1 (8)                  | 1                   | ..                      | ..                         | ..         | 1 (8)              | ..            | ..                  | ..                        | ..                          | ..           | ..                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 37.18                             | 1 (8)                  | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 1 (7)         | ..                      | 1                     | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 37.19                             | 1 (7)                  | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 1 (8)         | ..                      | 1                     | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 37.08                             | 1 (8)                  | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 1 (8)         | ..                      | 1                     | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 38.08                             | 1 (8)                  | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 1 (8)         | ..                      | ..                    | 1                   | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| Diseases Not Classified elsewhere | 261<br>(2047)          | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 255           | ..                      | 11                    | ..                  | 1        | ..                       | 1              | ..                | 4 (32)               | ..                          | ..                        | ..                                    | ..                            |
| 62.21                             | 256<br>(2008)          | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 252<br>(1977) | 244                     | 8                     | ..                  | 1        | 1                        | 1              | 1                 | 2 (16)               | 1                           | ..                        | 1                                     | ..                            |
| 62.22                             | 5<br>(39)              | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | 3             | ..                      | 3<br>(24)             | ..                  | ..       | ..                       | ..             | ..                | 2 (16)               | ..                          | ..                        | 2                                     | ..                            |
| Prenatal Influences               | 3 (24)                 | ..                  | ..                      | ..                         | ..         | ..                 | 1 (8)         | ..                  | ..                        | ..                          | ..           | ..                   | 2 (16)        | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| 80.20                             | 3 (24)                 | ..                  | ..                      | ..                         | ..         | ..                 | 1             | ..                  | ..                        | 1                           | ..           | ..                   | 2             | 2                       | ..                    | ..                  | ..       | ..                       | ..             | ..                | ..                   | ..                          | ..                        | ..                                    | ..                            |
| Aetiology Indefinite              | 38<br>(298)            | 6                   | ..                      | ..                         | ..         | ..                 | 1 (8)         | ..                  | ..                        | ..                          | ..           | ..                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | 1              | ..                | 30<br>(237)          | ..                          | ..                        | ..                                    | ..                            |
| 91.00                             | 11<br>(86)             | 5                   | 2                       | 2                          | 1          | ..                 | 1             | ..                  | ..                        | ..                          | ..           | 1                    | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | 5 (40)               | 1                           | 3                         | 1                                     | ..                            |
| 99.00                             | 14<br>(56)             | 1                   | 1                       | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | 1              | 1                 | 5 (40)               | ..                          | 1                         | ..                                    | 4                             |
| 95.99                             | 14<br>(110)            | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | 14 (110)             | ..                          | ..                        | 14                                    | ..                            |
| 95.02                             | 6 (47)                 | ..                  | ..                      | ..                         | ..         | ..                 | ..            | ..                  | ..                        | ..                          | ..           | ..                   | ..            | ..                      | ..                    | ..                  | ..       | ..                       | ..             | ..                | 6 (47)               | 2                           | 4                         | 4                                     | ..                            |

(Figures in the bracket indicate blindness rate)

| Date |       | Description |        | Amount |  |
|------|-------|-------------|--------|--------|--|
| 1890 | Jan 1 | Balance     |        | 100.00 |  |
|      |       | Jan 10      | Jan 10 | 10.00  |  |
|      |       | Jan 20      | Jan 20 | 20.00  |  |
|      |       | Jan 30      | Jan 30 | 30.00  |  |
|      |       | Feb 1       | Feb 1  | 40.00  |  |
|      |       | Feb 10      | Feb 10 | 50.00  |  |
|      |       | Feb 20      | Feb 20 | 60.00  |  |
|      |       | Feb 30      | Feb 30 | 70.00  |  |
|      |       | Mar 1       | Mar 1  | 80.00  |  |
|      |       | Mar 10      | Mar 10 | 90.00  |  |
|      |       | Mar 20      | Mar 20 | 100.00 |  |
|      |       | Mar 30      | Mar 30 | 110.00 |  |
|      |       | Apr 1       | Apr 1  | 120.00 |  |
|      |       | Apr 10      | Apr 10 | 130.00 |  |
|      |       | Apr 20      | Apr 20 | 140.00 |  |
|      |       | Apr 30      | Apr 30 | 150.00 |  |
|      |       | May 1       | May 1  | 160.00 |  |
|      |       | May 10      | May 10 | 170.00 |  |
|      |       | May 20      | May 20 | 180.00 |  |
|      |       | May 30      | May 30 | 190.00 |  |
|      |       | Jun 1       | Jun 1  | 200.00 |  |
|      |       | Jun 10      | Jun 10 | 210.00 |  |
|      |       | Jun 20      | Jun 20 | 220.00 |  |
|      |       | Jun 30      | Jun 30 | 230.00 |  |
|      |       | Jul 1       | Jul 1  | 240.00 |  |
|      |       | Jul 10      | Jul 10 | 250.00 |  |
|      |       | Jul 20      | Jul 20 | 260.00 |  |
|      |       | Jul 30      | Jul 30 | 270.00 |  |
|      |       | Aug 1       | Aug 1  | 280.00 |  |
|      |       | Aug 10      | Aug 10 | 290.00 |  |
|      |       | Aug 20      | Aug 20 | 300.00 |  |
|      |       | Aug 30      | Aug 30 | 310.00 |  |
|      |       | Sep 1       | Sep 1  | 320.00 |  |
|      |       | Sep 10      | Sep 10 | 330.00 |  |
|      |       | Sep 20      | Sep 20 | 340.00 |  |
|      |       | Sep 30      | Sep 30 | 350.00 |  |
|      |       | Oct 1       | Oct 1  | 360.00 |  |
|      |       | Oct 10      | Oct 10 | 370.00 |  |
|      |       | Oct 20      | Oct 20 | 380.00 |  |
|      |       | Oct 30      | Oct 30 | 390.00 |  |
|      |       | Nov 1       | Nov 1  | 400.00 |  |
|      |       | Nov 10      | Nov 10 | 410.00 |  |
|      |       | Nov 20      | Nov 20 | 420.00 |  |
|      |       | Nov 30      | Nov 30 | 430.00 |  |
|      |       | Dec 1       | Dec 1  | 440.00 |  |
|      |       | Dec 10      | Dec 10 | 450.00 |  |
|      |       | Dec 20      | Dec 20 | 460.00 |  |
|      |       | Dec 30      | Dec 30 | 470.00 |  |
|      |       | Total       | Total  | 480.00 |  |

TAL

743

ncurable

Total

nt- Unpreven-  
table.

6

13

48

102

...

88

...

691

...

262

...

2056

3

3

23

23

1

1

7

7

30

41

236

321

40

408

314

3200

32.2

972

30.4





**Table VII**  
**Blindness Rate by Site-Type**

|                             | KHARAR BLOCK |               |             |               |       | RAIPUR RANI BLOCK |                |             |               |       | TOTAL        |               |              |                |       |
|-----------------------------|--------------|---------------|-------------|---------------|-------|-------------------|----------------|-------------|---------------|-------|--------------|---------------|--------------|----------------|-------|
|                             | 8,142        |               |             |               |       | 4,601             |                |             |               |       | 12,743       |               |              |                |       |
|                             | Curable      |               | Incurable   |               | Total | Curable           |                | Incurable   |               | Total | Curable      |               | Incurable    |                | Total |
|                             | Preventable. | Unpreventable | Preventable | Unpreventable |       | Preventable.      | Unpreventable. | Preventable | Unpreventable |       | Preventable. | Unpreventable | Preventable. | Unpreventable. |       |
| EYE BALL IN GENERAL Number  | ...          | ...           | 3           | 5             | 8     | ...               | ...            | 4           | 1             | 5     | ...          | ...           | 7            | 6              | 13    |
| Blindness Rate (B.R.)       | ...          | ...           | 36          | 61            | 97    | ...               | ...            | 86          | 21            | 107   | ...          | ...           | 54           | 48             | 102   |
| CORNEA SCLERA number        | 18           | ...           | 38          | ...           | 56    | 9                 | ...            | 23          | ...           | 32    | 27           | ...           | 61           | ...            | 88    |
| B. R.                       | 221          | ...           | 466         | ...           | 687   | 195               | ...            | 500         | ...           | 695   | 212          | ...           | 479          | ...            | 691   |
| LENS number                 | ...          | 112           | 3           | ...           | 115   | ...               | 137            | 10          | ...           | 147   | ...          | 249           | 13           | ...            | 262   |
| B. R.                       | ...          | 1376          | 36          | ...           | 1412  | ...               | 2977           | 217         | 3194          | 3194  | ...          | 1954          | 102          | ...            | 2056  |
| OPTIC PATHWAYS number       | ..           | ...           | ...         | 3             | 3     | ...               | ...            | ...         | ...           | ...   | ...          | ...           | ...          | 3              | 3     |
| B. R.                       | ...          | ...           | ...         | 36            | 36    | ...               | ...            | ...         | ...           | ...   | ...          | ...           | ...          | 23             | 23    |
| RETINA number               | ...          | ...           | ...         | 1             | 1     | ...               | ...            | ...         | ..            | ...   | ...          | ...           | ...          | 1              | 1     |
| B. R.                       | ...          | ...           | ...         | 12            | 12    | ...               | ...            | ...         | ...           | ...   | ...          | ...           | ...          | 7              | 7     |
| SITE-TYPE INDEFINITE number | ...          | 8             | 3           | 16            | 27    | ...               | ...            | ...         | 14            | 14    | ...          | 8             | 3            | 30             | 41    |
| B. R.                       | ...          | 98            | 36          | 196           | 330   | ...               | ...            | ...         | 304           | 304   | ...          | 62            | 23           | 236            | 321   |
| TOTAL number                | 18           | 120           | 47          | 25            | 210   | 9                 | 137            | 37          | 15            | 198   | 27           | 257           | 84           | 40             | 408   |
| B. R.                       | 221          | 1474          | 574         | 305           | 2574  | 195               | 2977           | 803         | 325           | 4300  | 212          | 2016          | 658          | 314            | 3200  |
| %age                        | 13.1         | 86.9          | 65.3        | 34.7          |       | 6.2               | 93.8           | 71.2        | 28.8          |       | 9.5          | 90.5          | 67.8         | 32.2           |       |
| B. R.                       | 1695         |               | 879         |               |       | 3972              |                | 1128        |               |       | 2228         |               | 972          |                |       |
| %age                        | 65.8         |               | 34.2        |               |       | 73.8              |                | 26.2        |               |       | 69.6         |               | 30.4         |                |       |

Preventable : 111 (27%)

Unpreventable : 297 (72.8%)

(B. R. Blindness rate = Blind in one lakh of population)



Total

KHARAF

%age gro

%out of t

RAIPUR

Total

% age Gro

% out of

Grand To

Group%

% in tota

In general p

In one la





TABLE XV  
BILATERAL BLIND (By Site & Type)

|                       | EYEBALL IN GENERAL | 111-Glaucoma open angle | 113-Glaucoma not specified | 140-Myopia | 155-Atrophic Globe | CORNEA SCLERA | 318-Other keratitis | 310-Kerato-conjunctivitis | 340-Other Corneal Dystrophy | 315-Trachomatous | 390-Other affections | LENS  | 411-Cataract unoperated | 412-Cataract operated | 420-Dislocated Lens | RETINA | 660-Macular degeneration | OPTIC PATHWAYS | 720-Optic atrophy | SITE AND TYPE NOT DEFINITE | 955-Glaucoma in Combination | 951-Glaucoma and Cataract | 956-Cataract in combination | 990-Site and type not established | Grand Total |
|-----------------------|--------------------|-------------------------|----------------------------|------------|--------------------|---------------|---------------------|---------------------------|-----------------------------|------------------|----------------------|-------|-------------------------|-----------------------|---------------------|--------|--------------------------|----------------|-------------------|----------------------------|-----------------------------|---------------------------|-----------------------------|-----------------------------------|-------------|
| Total KHARAR          | 8                  | 2                       | 2                          | 1          | 3                  | 56            | 16                  | 14                        | 1                           | 7                | 18                   | 115   | 112                     | 3                     | —                   | 1      | 1                        | 3              | 3                 | 27                         | 2                           | 6                         | 15                          | 4                                 | 210         |
| %age group            |                    | 25                      | 25                         | 12.5       | 37.5               |               | 28.6                | 25                        | 1.8                         | 12.5             | 32.1                 |       | 97.4                    | 2.6                   |                     |        | 100                      |                | 100               |                            | 7.4                         | 22.2                      | 55.6                        | 14.8                              |             |
| %out of total blind   | 3.8                | 1.0                     | 1.0                        | 0.5        | 1.4                | 26.7          | 7.6                 | 6.7                       | 0.5                         | 3.3              | 8.6                  | 51.8  | 53.3                    | 1.4                   |                     | .5     | .5                       | 1.4            | 1.4               | 12.9                       | 1.0                         | 2.9                       | 7.1                         | 1.9                               |             |
| RAIPUR RANI           |                    |                         |                            |            |                    |               |                     |                           |                             |                  |                      |       |                         |                       |                     |        |                          |                |                   |                            |                             |                           |                             |                                   |             |
| Total                 | 5                  | 1                       |                            |            | 4                  | 32            | 2                   | 12                        |                             |                  | 18                   | 147   | 135                     | 11                    | 1                   |        |                          |                |                   | 14                         |                             |                           | 14                          |                                   | 198         |
| % age Group           |                    | 20                      |                            |            | 80                 |               | 6.3                 | 37.5                      |                             |                  | 56.3                 |       | 91.8                    | 7.5                   | .7                  |        |                          |                |                   |                            |                             |                           |                             | 100                               |             |
| % out of total blind  | 2.5                | .5                      |                            |            | 2.0                | 16.2          | 1.0                 | 6.1                       |                             |                  | 9.1                  | 74.2  | 68.2                    | 5.6                   | .5                  |        |                          |                |                   | 7.1                        |                             |                           | 7.1                         |                                   |             |
| Grand Total           | 13                 | 3                       | 2                          | 1          | 7                  | 88            | 18                  | 26                        | 1                           | 7                | 36                   | 262   | 247                     | 14                    | 1                   | 1      | 1                        | 3              | 3                 | 41                         | 2                           | 6                         | 29                          | 4                                 | 408         |
| Group%                |                    | 23.1                    | 15.4                       | 7.7        | 53.8               |               | 20.5                | 29.5                      | 1.1                         | 8                | 40.9                 |       | 94.3                    | 5.3                   | 0.4                 |        | 100                      |                | 100               |                            | 4.9                         | 14.6                      | 70.7                        | 9.8                               |             |
| % in total blind      | 3.1                | .7                      | .5                         | .3         | 1.7                | 21.5          | 4.4                 | 6.4                       | .3                          | 1.7              | 8.8                  | 64.2  | 60.5                    | 3.4                   | .3                  | .3     | .3                       | .7             | .7                | 10.0                       | .5                          | 1.5                       | 7.1                         | 1.0                               |             |
| In general population | .101               | .023                    | .016                       | .08        | .054               | .690          | .142                | .204                      | .008                        | .054             | .282                 | 2.056 | 1.937                   | .111                  | .008                | .008   | .008                     | .024           | .024              | .321                       | .016                        | .045                      | .227                        | .032                              | 3.2         |
| In one lakh           | 101                | 23                      | 16                         | 8          | 54                 | 690           | 142                 | 204                       | 8                           | 54               | 282                  | 2056  | 1937                    | 111                   | 8                   | 8      | 8                        | 24             | 24                | 321                        | 16                          | 46                        | 227                         | 32                                | 320         |

| GENERAL INFORMATION |    |    |    |    |    |    |    |    |     |
|---------------------|----|----|----|----|----|----|----|----|-----|
| 1                   | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
| 11                  | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20  |
| 21                  | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30  |
| 31                  | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40  |
| 41                  | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50  |
| 51                  | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60  |
| 61                  | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70  |
| 71                  | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80  |
| 81                  | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90  |
| 91                  | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

Bagchi reported glaucoma as 4.6%, Shukla (1965) 14%, Venkataswamy (1967) 25-28%. Our figures are 3.2% of glaucomatous blindness. The common flaw in most studies is the fact that digital tension is taken as criteria and early glaucoma is missed. The present study was done in part by digital tonometry and in part routine tonometry was done beyond 30 years of age. The figures for various countries are given in a table form :

**Table XV - A**

| Sl. No. | Country                           | %glaucoma, blindness |
|---------|-----------------------------------|----------------------|
| 1.      | Algeria                           | 6%                   |
| 2.      | Australia -                       |                      |
|         | Melbourne                         | 20.5%                |
|         | Queensland                        | 9.0%                 |
|         | Tasmania                          | 12.4%                |
| 3.      | Brazil                            | 0.68%                |
| 4.      | Canada                            | 11.7%                |
| 5.      | Ceylon                            | 4.94%                |
| 6.      | China -                           |                      |
|         | a) Cing - 1923                    | 6.8%                 |
|         | b) Chang - 1930                   | 8.9%                 |
| 7.      | Egypt                             | 10.0%                |
| 8.      | England & Wales                   | 13.0%                |
| 9.      | Finland                           | 22.5%                |
| 10.     | Germany                           | 15.1%                |
| 11.     | Greece                            | 16%                  |
| 12.     | Hungary                           | 8.3%                 |
| 13.     | India                             | 8.3%                 |
|         | a) Negaw (1937)                   | 9.0%                 |
|         | b) Bagchi (1934-36)               | 4.6%                 |
|         | b) Shukla (1965)                  | 14.00%               |
|         | d) Aggarwal (1967)                | 16.3%                |
|         | e) OURS. (Survey)                 | 3.5%                 |
|         | f) OURS (Hospital 35000 patients) | 10.7%                |
| 14.     | Italy                             | 11.0%                |
| 15.     | Japan                             | 9.0%                 |
| 16.     | Netherland                        | 12.9%                |
| 17.     | Nigeria                           | 10.00%               |



|     |                          |        |
|-----|--------------------------|--------|
| 18. | Phillipines Island       | 12.1%  |
| 19. | Poland                   | 12.6%  |
|     | -do- (Rostkowski - 1965) | 12.1%  |
| 20. | Rumania                  | 2.69%  |
| 21. | Scotland                 | 8.1%   |
| 22. | S. Africa                | 3.36%  |
| 23. | Sweden                   | 5.5%   |
| 24. | Switzerland              | 14.63% |
| 25. | Tunisia                  | 4.5%   |
| 26. | Uganda                   | 2.3%   |
| 27. | U.S.A.                   | 11.7%  |
| 28. | U.S.S.R.                 | 11.7%  |

a) Golwin (1928) 19.2%

b) Savaitov (1932) 21.8%

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### SORSBY 'A' (1950) An International Survey

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Other diseases are compared in Table XVI

**Table XVI**

|                           | Franken<br>1968 | Ours  |
|---------------------------|-----------------|-------|
| <b>Eyeball in general</b> |                 |       |
| Glaucoma                  | 11.68%          | 1.2%  |
| Myopia                    | 5.33%           | 0.3%  |
| Atrophic Globe.           | —               | 1.7%  |
| <b>Cornea</b>             |                 |       |
| Ophthalmia                | 4.06%           | —     |
| Trachoma                  | 13.19%          | 1.7%  |
| Others                    | 20.55%          | 19.8% |
| <b>Lens</b>               |                 |       |
| Unoperated                | 38.82%          | 60.5% |
| Operated                  | —               | 3.4%  |
| Dislocated                | —               | 0.3%  |

**Retina**

|                      |       |      |
|----------------------|-------|------|
| Tumour               | 0.25% | —    |
| Retinopathy          | 2.29% | —    |
| Macular Degeneration | —     | 0.3% |

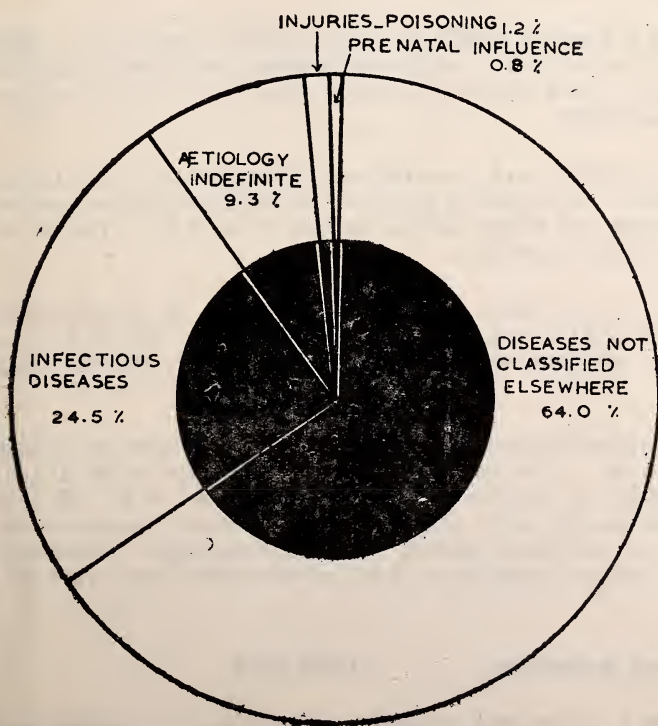
**Optic Atrophy**

|       |      |
|-------|------|
| 1.01% | 0.7% |
|-------|------|

**Site type indefinite**

|                               |       |      |
|-------------------------------|-------|------|
| Cataract in combination       | —     | 3.7% |
| Glaucoma in combination       | —     | 5.3% |
| Undetermined & not specified. | 2.31% | 1.0% |

Thus it is apparent that the whole pattern of disease is different in this area. Though Ophthalmia and Trachoma have contributed considerably towards blindness in dry belt, but the atrophic globe is not reported. In our own series atrophic globe takes a considerable toll. Myopic blindness is 0.3% in our series while it is 5.33% as reported from dry belt of Punjab.

**Aetiological Factors in Blindness (Table XVII & Fig. 8)****CAUSES OF BLINDNESS  
BY AETIOLOGY****Fig. 8**

Aetiologically, infectious diseases constituted 24.5% of its share, injuries and poisonings 1.2%, diseases not classified elsewhere (Senile degeneration) 64.0%. Prenatal influence in 0.8%. Indefinite aetiology (including multiple affections) 9.3%.

Corresponding figures reported from dry belt are 25.62%, infections (corneal ulcer 4.57%) injuries and poisonings, 7.1%, Prenatal influence 1.52%, indefinite aetiology 2.31%, unknown to sciences 54.82% (Franken-et-al).

Thus infections, injuries and prenatal influence is more in dry belt. We observe Syphilitic infection in 0.2%, Rubella 0.2%. Trachoma 12.7%, unidentified infections causing corneal opacities following corneal ulceration 8.5%.

Smallpox has been reported to cause blindness in 8.37% in the dry belt as reported by Franken-et-al, our series reveal it to be a contributing factor in 2.5% only. In Raipur Rani Block, this figure is 1% as compared to 3.8% in Kharar Block.

In South India, "McLaren (1955) stated Xerophthalmia as the most common cause of blindness. A survey in Madurai by Venkataswamy (1960) yielded 10% blindness due to Keratomalacia. This problem, however, is not encountered in Northern India.

Sharma & Prashad (1962) in U. P. reported cataract as a cause in 36%, active trachoma in 20.64% and mucopurulent ophthalmia 16.76% and Smallpox 13.97%. These workers, however, report both, one eye blind and both eyes blind together.

Ghosh (1969) found prevalence of blindness as 2.5% (taking one eyed blindness also). By aetiology cataract has been labelled as maximum (0.08%) Franken reports it as 0.76% while our figures are 2.1%. This is taken in terms of total population examined.

Chatterji-et al (1968) evaluating blindness in Himalayan areas, report blindness of 2.71% and 70.5% of the blindness was due to cataract. The later figure compares with the Raipur Rani Block (74.2%) reported in this study.

We encountered another unfortunate cause of blindness, operating in 3.4% of the total blind. It is due to surgical fault included under 411-37.18 --37.19 --37:08 and 62.21 (In the camps this figure rises to 6 - 10% just because most of the people who are blind are common denominators for all the camps which are held within the approachable distance). Multiple aetiological factors operated in 3.4% of the blind. They were all from Raipur Rani Block.

**Site Type and Aetiology :** (Table XIV)

**Cataract :** If one lakh persons are considered in general population then 2056 persons are blind because of lenticular changes. In this 8 are due





Aetiologically, infectious diseases constituted 24.5% of its share, injuries and poisonings 1.2%, diseases not classified elsewhere (Senile degeneration) 64.0%. Prenatal influence in 0.8%. Indefinite aetiology (including multiple affections) 9.3%.

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**Site Type and Aetiology :** (Table XIV)

**Cataract :** If one lakh persons are considered in general population then 2056 persons are blind because of lenticular changes. In this 8 are due

TABLE XVII  
BLINDNESS BY AETIOLOGY

|                |                       | All cases by aetiology | INFECTIOUS DISEASES | Rubella 18.00 | Syphilis 20.20 | Trachoma 22.00 | Other identified infectious diseases 28.90 | Unidentified Infections diseases 29.20 | INJURIES & POISONINGS. | Surgical 37.18 | Violence Blow or Fall 38.08 | Post-surgical 37.19 | Post-surgical 37.08 | Foreign Body-Occupational Activity 31.09 | DISEASES NOT CLASSIFIED ELSEWHERE | Senile Degeneration by reported diagnosis 62.22 | Assumed Senile Degen. 62.22 | PRE-NATAL INFLUENCE | Probable Hereditary Origin 80.20 | AETIOLOGY INDEFINITE | Unknown to Science 91.00 | Aet. not established 99.00 | All others 95.99 | Senile Degen. 95.02 |
|----------------|-----------------------|------------------------|---------------------|---------------|----------------|----------------|--------------------------------------------|----------------------------------------|------------------------|----------------|-----------------------------|---------------------|---------------------|------------------------------------------|-----------------------------------|-------------------------------------------------|-----------------------------|---------------------|----------------------------------|----------------------|--------------------------|----------------------------|------------------|---------------------|
| KHARAR         | Total No. of Persons. | 210                    | 65                  | 1             | —              | 29             | 9                                          | 26                                     | 2                      | —              | —                           | —                   | 1                   | 1                                        | 117                               | 114                                             | 3                           | 3                   | 3                                | 23                   | 10                       | 7                          | —                | 6                   |
|                | Group Percentage      | —                      | —                   | 1.5           | —              | 44.6           | 13.8                                       | 40.00                                  | —                      | —              | —                           | —                   | 50                  | 50                                       | —                                 | 97.4                                            | 2.6                         | —                   | 100                              | —                    | 43.5                     | 30.4                       | —                | 26.1                |
|                | Total Blind %age      | —                      | 31.0                | 0.5           | —              | 13.8           | 4.3                                        | 12.4                                   | 1                      | —              | —                           | —                   | 0.5                 | 0.5                                      | 55.7                              | 54.3                                            | 1.4                         | 1.4                 | 1.4                              | 11%                  | 4.8                      | 3.3                        | —                | 2.9                 |
| RAIPUR RANI    | Total No. of Persons. | 198                    | 36                  | —             | 1              | 23             | 3                                          | 9                                      | 3                      | 1              | 1                           | 1                   | —                   | —                                        | 144                               | 142                                             | 2                           | —                   | —                                | 15                   | 1                        | —                          | 14               | —                   |
|                | Group Percentage      | —                      | —                   | —             | 2.8            | 63.9           | 8.3                                        | 25.0                                   | —                      | 33.3           | 33.3                        | 33.3                | —                   | —                                        | —                                 | 98.6                                            | 1.4                         | —                   | —                                | —                    | 5.25                     | —                          | 93.75            | —                   |
|                | Total Blind %age      | —                      | 18.2                | —             | 0.5            | 11.6           | 1.5                                        | 4.5                                    | 1.5                    | 0.5            | 0.5                         | 0.5                 | —                   | —                                        | 72.7                              | 71.7                                            | 1.0                         | —                   | —                                | 7.6                  | 0.5                      | —                          | 7.1              | —                   |
| TOTAL          | Total No. of Persons. | 408                    | 101                 | 1             | 1              | 52             | 12                                         | 35                                     | 5                      | 1              | 1                           | 1                   | 1                   | 1                                        | 261                               | 256                                             | 5                           | 3                   | 3                                | 38                   | 11                       | 7                          | 14               | 6                   |
|                | Group Percentage      | —                      | —                   | 1.0           | 1.0            | 51.5           | 11.9                                       | 34.6                                   | —                      | 20.0           | 20.0                        | 20.0                | 20.0                | 20                                       | —                                 | 98.1                                            | 1.9                         | —                   | 100                              | —                    | 28.9                     | 18.4                       | 36.8             | 15.8                |
|                | Total Blind %age      | —                      | 24.7                | 0.3           | 0.2            | 12.7           | 2.9                                        | 8.6                                    | 1.2                    | 0.3            | 0.3                         | .2                  | .2                  | .2                                       | 64.0                              | 62.7                                            | 1.2                         | 0.7                 | 0.7                              | 9.3                  | 2.7                      | 1.7                        | 3.4              | 1.5                 |
| BLINDNESS RATE |                       | 3200                   | 792                 | 8             | 8              | 407            | 94                                         | 275                                    | 39                     | 7              | 8                           | 8                   | 8                   | 8                                        | 2047                              | 2008                                            | 39                          | 24                  | 24                               | 293                  | 86                       | 55                         | 110              | 47                  |



to Rubella, 23 due to faulty surgery, 8 due to injury, 1977 due to senility, 24 assumed senile changes and 16 had prenatal influence.

### **Corneal Diseases :**

690 blind persons/lakh are due to corneal disease. These are due to infectious disease in 674, prenatal influence in 8 and indefinite aetiology in 8.

In the infectious group 376 are due to trachoma, 56 due to smallpox and unknown infections, and 241 due to unidentified corneal infections causing ulcers and subsequently corneal opacity.

### **Eyeball in General :**

In one lakh, 101 have blindness due to Glaucoma and myopia and Phthisis Bulbi, 23 have glaucoma (open-angle) and 16 unspecified glaucoma, 8 having myopia and 54 atrophic globe. In this last group 46 are due to infection and 8 due to injury. Infections include Syphilis, Trachoma, Smallpox, and other non-specified infections. 8 are due to syphilis, 8 trachoma, 16 smallpox 16 following corneal ulcers.

### **Retina & Optic Pathways**

32/ lakh are blind due to this group. 8 having macular degeneration and 24 due to optic atrophy out of which 1/3rd are due to meningococcal infection, in 1/3 it is senile phenomenon, and in 1/3rd it is due to unknown causes.

### **Site Type Indefinite :**

321/lakh fall in this category; out of which 54 had infective process, where, corneal opacity and cataract were in combination; 23 of these opacities were due to Trachoma and 23 due to Smallpox and 8 due to unidentified infections.

32 fall in the group of "diseases not classified elsewhere." (16 being senile and 16 presumed senile). In 237 aetiology was indefinite.

Amongst the total 321 in this group of site type indefinite. 16 had 'glaucoma in combination, 46 'glaucoma and cataract', 227 'cataract in combination and in 32 site type could not be established.

### **Visual Acuity : (Table XVIII)**

Out of the total blind encountered, 24.7% have 6/60 vision, 12% have vision 5/60 & 4/60, 19.4% have 3/60 and 2/60 & in 30.4% it is 1/60 & hand movements. Amongst the rest 7.1% have only light perception, 6.4% complete blindness. It is thus 6.4% of the blind who are stone-blind.

This makes it 204/lakh who are stone blind. (119 in this are males and 85 females) c.f. total blind where 1717 are females and 1483 males.) Amongst those stone blind 8 are in the 1st. decade, 24 in the third decade, 16 in the fourth, 24 in the fifth, 54 in the sixth decade and 16 in the seventh decade. 62 are over 70.



Table XVIII

## VISUAL ACUITY—(BILATERAL BLIND)

| Age group                | 6/60 |        | 5/60-4/60 |        | 3/60-2/60 |        | 1/60 - HM |        | PL-PR |        | Absolute Blindness |        | Total |        | Total      |
|--------------------------|------|--------|-----------|--------|-----------|--------|-----------|--------|-------|--------|--------------------|--------|-------|--------|------------|
|                          | Male | Female | Male      | Female | Male      | Female | Male      | Female | Male  | Female | Male               | Female | Male  | Female |            |
| 0-10                     | —    | —      | —         | —      | —         | —      | 1         | —      | —     | —      | 1                  | —      | 2     | —      | 2 0.500    |
| 11-20                    | —    | —      | —         | —      | —         | 1      | —         | —      | —     | —      | —                  | —      | —     | 1      | 1 0.300    |
| 21-30                    | —    | —      | 2         | —      | 2         | 1      | 2         | 1      | —     | —      | —                  | 3      | 6     | 5      | 11 2.700   |
| 31-40                    | 4    | 9      | 1         | 1      | 1         | 6      | —         | 4      | —     | —      | —                  | 2      | 6     | 22     | 28 6.900   |
| 41-50                    | 9    | 20     | 3         | 2      | 5         | 9      | 4         | 7      | 1     | 2      | 1                  | 2      | 23    | 42     | 65 15.900  |
| 51-60                    | 11   | 14     | 3         | 8      | 9         | 14     | 15        | 15     | —     | 3      | 5                  | 2      | 43    | 56     | 99 24.310  |
| 61-70                    | 17   | 8      | 8         | 6      | 11        | 6      | 21        | 26     | 4     | 7      | 1                  | 1      | 62    | 54     | 116 28.400 |
| Above 70                 | 8    | 1      | 9         | 6      | 7         | 7      | 13        | 15     | 7     | 5      | 3                  | 5      | 47    | 39     | 86 21.000  |
| Total                    | 49   | 52     | 26        | 23     | 35        | 44     | 56        | 68     | 12    | 17     | 11                 | 15     | 189   | 219    | 408        |
| Male/<br>Female<br>Total | 101  | 49     | 79        | 124    | 29        | 26     | 6.4       | 7.1    | 46.3  | 53.7   | 100%               |        |       |        |            |
| Percentage : 24.7        | 12.0 | 19.4   | 30.4      | 6.4    | 7.1       | 46.3   | 53.7      | 100%   |       |        |                    |        |       |        |            |

Blindness & Sex :

( Table XIX).

BLINDNESS BY SITE AND TYPE IN MALE & FEMALE POPULATION.

Total Males : 6,687.

Total Females : 6,056.

|                     | Male | Percentage in<br>Male Population | Female | Percentage in<br>Female Population | Remarks    |
|---------------------|------|----------------------------------|--------|------------------------------------|------------|
| Eye Ball in General | 8    | 0.119                            | 5      | 0.082                              | (p > 0.05) |
| Cornea-Sclera       | 41   | 0.613                            | 47     | 0.776                              | (p > 0.05) |
| Lens                | 119  | 1.779                            | 143    | 2.361                              | (p < 0.05) |
| Retina              | 1    | 0.015                            | —      | —                                  | —          |
| Optic Nerve         | 2    | 0.029                            | 1      | 0.016                              | (p > 0.05) |
| Site Type           | 18   | 0.269                            | 23     | 0.379                              | (p > 0.05) |
| Indefinite          | 189  | 2.826                            | 219    | 3.616                              |            |

It has been pointed out earlier as well that blindness in females is significantly high (p < .01).

Taken by site and type, the involvement of eyeball in general is .119% in males and .082% in females. It is not statistically significant (p> .05). Corneal involvement is 0.613% and .776% in males and females, respectively (Statistically non-significant p> .05). Involvement of the lens is 1.779% in males and 2.361% in females (This difference is highly significant p < .05). Retinal involvement .015% in males only. Optic atrophy is .029% in males and .016% in females (Statistically not significant p > .05). Site type indefinite is .269% in the males and .379% in the females (Statistically insignificant p> .05)

Thus lens involvement is the only significant factor contributing towards higher incidence in the females.

Aetiologically considered (Table 20) and infectious diseases are .747% in the males and .858% in the females (not-significant p > .05). Injuries .029% males .049% females (not significant p > .05). Diseases not classified elsewhere (including Senile degeneration indicated by diagnosis) are 1.749% in males and 2.361% in the females (The difference is highly significant p<.01) Prenatal influence could be observed only in males in .044%—"Aetiology indefinite or not reported". also does not show any difference in the males and females.

**Table XX**

**BILATERAL BLIND BY AETIOLOGY IN MALE & FEMALE POPULATION.**

| Aetiological Diseases                        | Male       | 6,687 Percentage | Female     | 6,056 Percentage | Remarks                                             |
|----------------------------------------------|------------|------------------|------------|------------------|-----------------------------------------------------|
| Infections                                   | 50         | 0.747            | 52         | 0.858            | The difference is not significant.<br>( $p > .05$ ) |
| Injuries                                     | 2          | 0.029            | 3          | 0.049            | The difference is not significant.<br>( $p > .05$ ) |
| Diseases not classified elsewhere            | 117        | 1.749            | 143        | 2.361            | The difference is significant.<br>( $p < .01$ )     |
| Prenatal Influence, not classified elsewhere | 3          | 0.044            | —          | —                |                                                     |
| Aetiology indefinite or not reported.        | 17         | 0.254            | 21         | 0.346            | The difference is not significant.<br>( $p > .05$ ) |
| <b>TOTAL</b>                                 | <b>189</b> | <b>2.826</b>     | <b>219</b> | <b>3.614</b>     | The difference is significant.<br>( $p < .01$ )     |

## Unilateral Blindness

3.272% of the total population have blindness (vision 6/60 or less) in one eye only: (This is comparable to bilateral blindness which is 3.2%). Taking age group wise 0.247% are one eyed blind in the first decade. For subsequent decades the figures are 0.793%, 2.584%, 4.642%, 7.613%, 11.078%, 16.964% and 22.457% for 2nd, 3rd, 4th, 5th, 6th, 7th, decade and beyond it, thus showing a progressive rise right from 1st decade. (Table XXI)

Taken as blindness rate (Table 22 A,B,C,D,E) 86 persons are blind of one eye in the first decade, general eye ball involvement is seen in 16 (8 have multiple congenital anomalies, 8 have phthisis bulbi following small pox). Corneal involvement accounts for 30 cases (16 have corneal opacities due to trachoma, 7 have corneal involvement due to corneal ulcer and 7 have corneal opacities which are unspecified). Lens is involved in 16, all being traumatic in nature. 8 have congenital persistent hyperplastic vitreous, 8 have anisometropic amblyopia and 8 have cataract in combination with opacities of cornea and / or glaucoma etc. (Table 22 C, D, E.)

In the second decade, out of 180 persons having unilateral blindness, 32 have phthisis bulbi. (8 are due to small pox, 16 following unidentified corneal infections and the rest 8 due to unspecified causes). 118 have blindness due to corneal opacities (40 due to small pox, 64 due to corneal ulceration and out of remaining 14 cases, 7 are due to nutritional deficiency and another 7 due to chemical burns).

23 have lenticular opacities — (15 due to injury and 8 due to congenital cataract)

Rest of the 7 are grouped in unspecified group,

### 3rd decade :

In the 3rd decade, 354 are one eyed blind. out of this 40 have general eye ball diseases, (32 have phthisis bulbi and 8 have myopic degeneration).

194 have corneal opacities, 45 due to small pox. 104 due to corneal ulcers, 16 due to trachoma and in the rest 29 cases, 14 are due to occupational activity and in 15 cases aetiology could not be established.

40 cases have lenticular opacities (32 unoperated and 8 operated). Out of these 32 cases are of presenile cataract (8 congenital cataract and 8 due to occupational and 8 due to recreational injury, 8 have macular degeneration and optic atrophy).

Sixty four cases have site-type indefinite, "cataract in combination" in 16 and amblyopia in 48 cases.

### 4th decade :

In the 4th decade 478 persons are blind of one eye. In 102 there is "general eye ball" involvement, 188 have corneal diseases, 110 lens changes,



7 retinal disease and 71 "site type indefinite".

In eye ball diseases the causal factors are as follows. Glaucoma in 8, myopia in 8, atrophic globe due to small pox in 22, following corneal ulcer in 40 and phthisis following injury in 16 and in 8 cases multiple congenital anomaly are encountered.

Corneal disease accounted for 188 cases. Aetiological factors in this are trachoma in 46, small pox in 38, ulcer in 88, injury in 8 and 8 cases are listed as undiagnosed.

Lens diseases are present in 110 cases. It is presenile type of cataract in 95 and traumatic cataract in 15 cases.

Macular degeneration is present in 7, cataract in combination in 16, myopia in any other combination in 8 amblyopia was found in 47 cases.

#### 5th decade :

In the 5th decade 581 persons (one eye blind) are encountered. 48 cases have "general eye ball" disease out of which 40 are due to phthisis bulbi and 8 due to glaucoma. The cause of phthisis bulbi is small pox in 16, ulceration in 8 and trauma in 16 cases.

In 116 cases it is corneal disease that accounted for the blindness. In 76 it is following corneal ulceration, trachoma in 8, small pox in 16 and in 16 cases aetiology could not be established.

The cataract accounted for this unilateral blindness in 324 persons. Senile cataract is present in 284 aphakia in 24, traumatic cataract in 8 and dislocated lens in 8 cases. Uveitis is present in 7 cases.

#### 6th decade.

In the 6th decade 597 persons have unilateral blindness. 38 cases had general eye ball involvement, 134 cases had corneal involvement, 361 cataract and in 64 cases site type was indefinite.

The general eye ball diseases were caused due to glaucoma in 8, phthisis in 16 due to trauma of various types and aetiology could not be established in 14 cases,

In corneal involvement 32 were due to small pox, 86 due to corneal ulceration, 8 due to corneal dystrophy and in 8 cases etiology could not be established.

The unilateral blindness due to lenticular changes was present in 361 persons. It was unoperated in 329 while operated in 16 cases. In 16 subjects the lens was dislocated due to unknown factors.

In 64 cases the site type is indefinite. In 56 it is "cataract in combination" and amblyopia is present in 8 cases.

#### **7th decade :**

In the 7th decade, 581 persons have one eye blindness. The general eye ball involvement in 30, corneal and scleral involvement in 86, cataract in 395, optic atrophy in 8 and in 62 cases site type is indefinite.

In general eye ball involvement, 22 had glaucoma and phthisis bulbi, 8 due to small pox. Amongst 86 corneal diseases 38 are following corneal ulceration, 8 because of trachoma and in 32 cases occupational trauma was responsible. In 8 cases no definite aetiology could be labelled.

In 395 cases this blindness was due to lenticular changes. Only 8 were operated and rest were unoperated.

8 cases have optic atrophy due to trauma. Amongst the rest 62 cases, 38 have cataract in combination while 16 have amblyopia and in 8 glaucoma in combination.

#### **Beyond 7th decade :**

415 persons have one eye blind. In 22 there is general eye ball involvement, out of it 8 due to glaucoma, 7 phthisis bulbi following ulceration and in 7 phthisis due to unknown causes.

38 cases have corneal diseases. In 8 it is due to trachoma, ulceration in 16 and due to injury in 14 cases.

In 285 it is due to cataract, which is unoperated in 269 and operated in 16 cases.

The remaining 70 in this age group fall in site type indefinite group, where "cataract in combination" is present in all the 70 cases.

In general (Table 23) eye ball involvement is present in 10.07%, corneal in 27.83%, lens in 47.25% and the remaining 14.84 have uveal, optic nerve, retinal involvement and other diseases in combinations.

Table XXI

## VISUAL ACUITY IN UNILATERAL BLIND CASES

| Age Group   | 6/60 |    | 5/60-4/60 |    | 3/60-2/60 |    | 1/60-HM |    | PL - PR |    | Complete Blind |    | Total |     | Total | %     | %      | %    | in total one eye blind |
|-------------|------|----|-----------|----|-----------|----|---------|----|---------|----|----------------|----|-------|-----|-------|-------|--------|------|------------------------|
|             | M    | F  | M         | F  | M         | F  | M       | F  | M       | F  | M              | F  | M     | F   |       |       |        |      |                        |
| 0-10        | —    | 1  | —         | —  | —         | 1  | 5       | 1  | 2       | —  | —              | 1  | 7     | 4   | 11    | 0.086 | 0.247  | 2.6  |                        |
| 11-20       | 1    | —  | 2         | 1  | 1         | 1  | 5       | 5  | —       | 1  | 1              | 5  | 10    | 13  | 23    | 0.180 | 0.793  | 5.5  |                        |
| 21-30       | 4    | 6  | 3         | 3  | 4         | 1  | 8       | 8  | 3       | 2  | 1              | 2  | 23    | 22  | 45    | 0.354 | 2.584  | 10.8 |                        |
| 31-40       | 2    | 10 | 5         | 7  | 2         | 5  | 6       | 9  | 1       | 3  | 7              | 4  | 23    | 38  | 61    | 0.478 | 4.642  | 14.6 |                        |
| 41-50       | 8    | 4  | 7         | 4  | 4         | 2  | 10      | 17 | 3       | 4  | 9              | 2  | 41    | 33  | 74    | 0.581 | 7.613  | 17.7 |                        |
| 51-60       | 6    | 9  | 3         | 4  | 5         | 5  | 15      | 12 | 5       | 5  | 3              | 4  | 37    | 39  | 76    | 0.597 | 11.078 | 18.2 |                        |
| 61-70       | 5    | 5  | 3         | 4  | 4         | 3  | 11      | 7  | 5       | 16 | 6              | 5  | 34    | 40  | 74    | 0.581 | 16.964 | 17.7 |                        |
| Over 70     | 3    | —  | 3         | 3  | 3         | —  | 14      | 10 | 7       | 4  | 3              | 3  | 33    | 20  | 53    | 0.415 | 22.457 | 12.9 |                        |
| Total       | 29   | 35 | 26        | 26 | 23        | 18 | 74      | 69 | 26      | 35 | 30             | 26 | 208   | 209 | 417   | 3.272 |        |      |                        |
| M & F Total | 64   | 52 | 41        | 41 | 143       | 56 |         |    |         |    |                |    |       |     |       |       |        |      |                        |

Percentage out of 417 15.4 12.5 9.8 34.3 14.6 13.4

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| <p> <b>Glaucoma</b><br/> <b>Open Angle</b><br/> <b>Glaucoma-Surgical</b><br/> <b>or Medical</b><br/> <b>Procedure</b><br/> <b>Glaucoma-Type</b><br/> <b>not specified</b><br/> <b>Glaucoma-Aetiology</b><br/> <b>not established or</b><br/> <b>reported</b><br/> <b>Myopia</b><br/> <b>Aetiology not re-</b><br/> <b>ported or estab-</b><br/> <b>lished</b><br/> <b>Multiple conga-</b><br/> <b>nit malforma-</b><br/> <b>tion. Heredity</b><br/> <b>probable</b><br/> <b>Mult Cong. Ocu-</b><br/> <b>lar Malformation,</b><br/> <b>Congenital origin</b><br/> <b>not elsewhere</b><br/> <b>classified</b><br/> <b>Atrophic Globe</b><br/> <b>Small-pox</b><br/> <b>Atrophic Globe</b><br/> <b>Unidentified</b><br/> <b>infections (Cornea</b><br/> <b>Ulcer)</b><br/> <b>Atrophic Globe</b><br/> <b>Recreational activi-</b><br/> <b>ty-Blow or fall</b><br/> <b>Atrophic Globe-</b><br/> <b>Foreign body in</b><br/> <b>eye</b><br/> <b>Atrophic Globe</b><br/> <b>Unidentified in-</b><br/> <b>fectious diseases</b><br/> <b>Prenatal</b><br/> <b>Atrophic Globe-</b><br/> <b>Occupational</b><br/> <b>Atrophic Globe-</b><br/> <b>Violent act</b><br/> <b>Atrophic Globe-</b><br/> <b>Causal activity not</b><br/> <b>specified</b><br/> <b>Atrophic Globe</b><br/> <b>etiology not es-</b><br/> <b>tablished</b><br/> <b>Others affections</b> </p> |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|



**Table XXI**  
**VISUAL ACUITY IN UNILATERAL BLIND CASES**

| Age Group   | 6/60 |    | 5/60-4/60 |    | 3/60-2/60 |    | 1/60-HM |    | PL - PR |    | Complete Blind |    | Total |     | Total Grand | % In total population | % in group population | % in total one eye blind |
|-------------|------|----|-----------|----|-----------|----|---------|----|---------|----|----------------|----|-------|-----|-------------|-----------------------|-----------------------|--------------------------|
|             | M    | F  | M         | F  | M         | F  | M       | F  | M       | F  | M              | F  | M     | F   |             |                       |                       |                          |
| 0-10        | —    | 1  | —         | —  | —         | 1  | 5       | 1  | 2       | —  | —              | 1  | 7     | 4   | 11          | 0.086                 | 0.247                 | 2.6                      |
| 11-20       | 1    | —  | 2         | 1  | 1         | 1  | 5       | 5  | —       | 1  | 1              | 5  | 10    | 13  | 23          | 0.180                 | 0.793                 | 5.5                      |
| 21-30       | 4    | 6  | 3         | 3  | 4         | 1  | 8       | 8  | 3       | 2  | 1              | 2  | 23    | 22  | 45          | 0.354                 | 2.584                 | 10.8                     |
| 31-40       | 2    | 10 | 5         | 7  | 2         | 5  | 6       | 9  | 1       | 3  | 7              | 4  | 23    | 38  | 61          | 0.478                 | 4.642                 | 14.6                     |
| 41-50       | 8    | 4  | 7         | 4  | 4         | 2  | 10      | 17 | 3       | 4  | 9              | 2  | 41    | 33  | 74          | 0.581                 | 7.613                 | 17.7                     |
| 51-60       | 6    | 9  | 3         | 4  | 5         | 5  | 15      | 12 | 5       | 5  | 3              | 4  | 37    | 39  | 76          | 0.597                 | 11.078                | 18.2                     |
| 61-70       | 5    | 5  | 3         | 4  | 4         | 3  | 11      | 7  | 5       | 16 | 6              | 5  | 34    | 40  | 74          | 0.581                 | 16.964                | 17.7                     |
| Over 70     | 3    | —  | 3         | 3  | 3         | —  | 14      | 10 | 7       | 4  | 3              | 3  | 33    | 20  | 53          | 0.415                 | 22.457                | 12.9                     |
| Total       | 29   | 35 | 26        | 26 | 23        | 18 | 74      | 69 | 26      | 35 | 30             | 26 | 208   | 209 | 417         | 3.272                 |                       |                          |
| M & F Total | 64   | 52 | 41        | 41 | 143       | 56 |         |    |         |    |                |    |       |     |             |                       |                       |                          |

|                       |      |      |     |      |      |      |
|-----------------------|------|------|-----|------|------|------|
| Percentage out of 417 | 15.4 | 12.5 | 9.8 | 34.3 | 14.6 | 13.4 |
|-----------------------|------|------|-----|------|------|------|

**TABLE—XXII A**  
**EYEBALL IN GENERAL**

|                                                                                      | 0-10      |           | 11-20    |           | 21-30     |           | 31-40     |           | 41-50     |          | 51-60    |           | 61-70     |          | Above 70 |           | Total      |
|--------------------------------------------------------------------------------------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|-----------|----------|----------|-----------|------------|
|                                                                                      | M         | F         | M        | F         | M         | F         | M         | F         | M         | F        | M        | F         | M         | F        | M        | F         |            |
| <b>Glaucoma</b>                                                                      |           |           |          |           |           |           |           |           |           |          |          |           |           |          |          |           |            |
| Open Angle 111-91.00                                                                 | —         | —         | —        | —         | —         | —         | —         | 8         | 8         | —        | —        | —         | 8         | —        | —        | —         | 24         |
| Glaucoma-Surgical or Medical Procedure 111-37.19                                     | —         | —         | —        | —         | —         | —         | —         | —         | —         | —        | —        | —         | 7         | —        | —        | —         | 7          |
| Glaucoma-Type not specified 113-91.00                                                | —         | —         | —        | —         | —         | —         | —         | —         | —         | —        | 8        | —         | —         | —        | —        | 8         | 16         |
| Glaucoma-Aetiology not established or reported 113-99.00                             | —         | —         | —        | —         | —         | —         | —         | —         | —         | —        | —        | —         | 7         | —        | —        | —         | 7          |
| Myopia 140-91.00                                                                     | —         | —         | —        | —         | 8         | —         | —         | 8         | —         | —        | —        | —         | —         | —        | —        | —         | 16         |
| Aetiology not reported or established                                                |           |           |          |           |           |           |           |           |           |          |          |           |           |          |          |           |            |
| Multiple congenital malformation. Heredity probable 147-80.20                        | —         | 8         | —        | —         | —         | —         | —         | —         | —         | —        | —        | —         | —         | —        | —        | —         | 8          |
| Mult Cong. Ocular Malformation, Congenital origin not elsewhere classified 147-89.00 | —         | —         | —        | —         | —         | —         | —         | 8         | —         | —        | —        | —         | —         | —        | —        | —         | 8          |
| Atrophic Globe                                                                       |           |           |          |           |           |           |           |           |           |          |          |           |           |          |          |           |            |
| Small-pox 155-28.20                                                                  | —         | 8         | —        | 8         | 8         | —         | 8         | 14        | 16        | —        | —        | —         | —         | —        | —        | —         | 62         |
| Atrophic Globe Unidentified infections (Corneal Ulcer) 155-29.20                     | —         | —         | 8        | 8         | —         | 8         | 40        | —         | 8         | —        | —        | —         | 8         | —        | —        | 8         | 87         |
| Atrophic Globe-Recreational activity-Blow or fall 155-34.08                          | —         | —         | —        | —         | —         | —         | —         | —         | 8         | —        | —        | 8         | —         | —        | —        | —         | 16         |
| Atrophic Globe-Foreign body in eye 155-34.09                                         | —         | —         | —        | —         | —         | 8         | —         | 8         | —         | —        | —        | —         | —         | —        | —        | —         | 16         |
| Atrophic Globe Unidentified infectious diseases                                      |           |           |          |           |           |           |           |           |           |          |          |           |           |          |          |           |            |
| Prenatal 155-29.10                                                                   | —         | —         | —        | —         | —         | 8         | —         | —         | —         | —        | —        | —         | —         | —        | —        | —         | 8          |
| Atrophic Globe-Occupational 155-31.09                                                | —         | —         | —        | —         | —         | —         | —         | 8         | 8         | —        | —        | —         | —         | —        | —        | —         | 16         |
| Atrophic Globe-Violent act 155-38.09                                                 | —         | —         | —        | —         | —         | —         | —         | —         | —         | —        | 8        | —         | —         | —        | —        | —         | 8          |
| Atrophic Globe-Canal activity not specified 155-49.19                                | —         | —         | —        | 8         | —         | —         | —         | —         | —         | —        | —        | —         | —         | —        | —        | —         | 8          |
| Atrophic Globe etiology not established 155-99.00                                    | —         | —         | —        | —         | —         | —         | —         | —         | —         | —        | —        | 7         | —         | —        | 7        | —         | 14         |
| Others affections 190-29.20                                                          | —         | —         | —        | —         | —         | —         | —         | —         | —         | —        | —        | 7         | —         | —        | —        | —         | 7          |
| <b>TOTAL :</b>                                                                       | <b>16</b> | <b>16</b> | <b>8</b> | <b>24</b> | <b>16</b> | <b>24</b> | <b>48</b> | <b>54</b> | <b>48</b> | <b>—</b> | <b>8</b> | <b>30</b> | <b>23</b> | <b>7</b> | <b>1</b> | <b>15</b> | <b>328</b> |



..

Kerato-Conjunctivitis  
 Trachoma  
 Corneal Opacity-  
 Pannus Trachoma  
 Corneal Opacity-  
 Pannus. Specified Di  
 ease not classified  
 elsewhere  
 Corneal Opacity  
 Small Pox  
 C.O. Unidentified  
 Infection (Corneal  
 Ulcer)  
 Other corneal dys-  
 trophy (Xerophthal-  
 mia. Nutritional  
 deficiency)  
 Other Corneal dys-  
 trophy Aetiology  
 not established  
 Other affections of  
 cornea-sclera  
 (Corneal Opacity,  
 trachoma)  
 Corneal Opacity  
 (Small-pox)  
 C.O. (Corneal Ulcer)  
 C.O. (Chemical  
 Causes-Injury)  
 C.O. (Causal Agent  
 not specified)  
 C.O. Causal Activity  
 not specified)  
 C.O. Occupational  
 Activity-Blow or  
 Fall  
 Corneal Opacity -  
 Diseases not cla-  
 ssified elsewhere  
 Corneal Opacity-  
 Aetiology not  
 established or not  
 reported





TABLE XXII-B

## UNILATERAL BLINDNESS PER ONE LAKH POPULATION

CORNEA SCLERA

| ..                                                                             | Age ..<br>Sex .. | O .. 10 |    | 11 .. 20 |    | 21 .. 30 |    | 31 .. 40 |     | 41 .. 50 |    | 51 .. 60 |    | 61 .. 70 |    | Above 70 |    | TOTAL |
|--------------------------------------------------------------------------------|------------------|---------|----|----------|----|----------|----|----------|-----|----------|----|----------|----|----------|----|----------|----|-------|
|                                                                                |                  | M       | F  | M        | F  | M        | F  | M        | F   | M        | F  | M        | F  | M        | F  | M        | F  |       |
| Kerato-Conjunctivitis                                                          |                  |         |    |          |    |          |    |          |     |          |    |          |    |          |    |          |    |       |
| Trachoma                                                                       | 310 .. 22.00 ..  | ..      | .. | ..       | .. | 8        | .. | ..       | 14  | ..       | .. | ..       | .. | ..       | .. | ..       | 8  | 30    |
| Corneal Opacity-<br>Pannus Trachoma                                            | 315 .. 22.00 ..  | ..      | 8  | ..       | .. | ..       | .. | ..       | 8   | ..       | .. | ..       | .. | ..       | .. | ..       | .. | 16    |
| Corneal Opacity-<br>Pannus. Specified Dis-<br>ease not classified<br>elsewhere | 315 .. 78.00 ..  | 8       | .. | ..       | .. | ..       | .. | ..       | ..  | ..       | .. | ..       | .. | ..       | .. | ..       | .. | 8     |
| Corneal Opacity<br>Small Pox                                                   | 318 .. 28.00 ..  | ..      | .. | 16       | 8  | 15       | 16 | 14       | 8   | ..       | .. | 16       | 8  | ..       | .. | ..       | .. | 101   |
| C.O. Unidentified<br>Infection (Corneal<br>Ulcer)                              | 318 .. 29.00 ..  | 7       | .. | 24       | 16 | 48       | 8  | 32       | 40  | 36       | .. | 23       | 16 | 8        | 22 | 8        | .. | 288   |
| Other corneal dys-<br>trophy (Xerophthal-<br>mia, Nutritional<br>deficiency)   | 340 .. 62.30 ..  | ..      | .. | ..       | 7  | ..       | .. | ..       | ..  | ..       | .. | ..       | .. | ..       | .. | ..       | .. | 7     |
| Other Corneal dys-<br>trophy Aetiology<br>not established                      | 340 .. 99.00 ..  | ..      | .. | ..       | .. | ..       | .. | ..       | ..  | ..       | .. | 8        | .. | ..       | .. | ..       | .. | 8     |
| Other affections of<br>cornea-sclera<br>(Corneal Opacity,<br>trachoma)         | 390 .. 22.00 ..  | ..      | .. | ..       | .. | ..       | 8  | 8        | 16  | ..       | 8  | ..       | .. | 8        | .. | ..       | .. | 48    |
| Corneal Opacity<br>(Small-pox)                                                 | 390 .. 28.20 ..  | ..      | .. | ..       | 16 | ..       | 14 | 8        | 8   | 8        | 8  | 8        | .. | ..       | .. | ..       | .. | 71    |
| C.O. (Corneal Ulcer)                                                           | 390 .. 29.00 ..  | ..      | .. | 8        | 16 | 16       | 32 | 8        | 8   | 24       | 16 | 31       | 16 | ..       | 8  | ..       | 8  | 191   |
| C.O. (Chemical<br>Causes-Injury)                                               | 390 .. 48.01 ..  | ..      | .. | ..       | 7  | ..       | .. | ..       | ..  | ..       | .. | ..       | .. | ..       | .. | ..       | .. | 7     |
| C.O. (Causal Agent<br>not specified)                                           | 390 .. 48.19 ..  | ..      | .. | ..       | .. | ..       | 8  | ..       | ..  | ..       | .. | ..       | .. | ..       | .. | ..       | .. | 8     |
| C.O. Causal Activity<br>not specified)                                         | 390 .. 49.19 ..  | 7       | .. | ..       | .. | ..       | .. | ..       | ..  | ..       | .. | ..       | .. | ..       | .. | ..       | .. | 7     |
| C.O. Occupational<br>Activity-Blow or<br>Fall                                  | 390 .. 31.09 ..  | ..      | .. | ..       | .. | 7        | 7  | ..       | 8   | ..       | .. | ..       | .. | 24       | 8  | 7        | 7  | 68    |
| Corneal Opacity -<br>Diseases not clas-<br>sified elsewhere                    | 390 .. 78.00 ..  | ..      | .. | ..       | .. | ..       | .. | ..       | ..  | 8        | .. | ..       | .. | ..       | .. | ..       | .. | 8     |
| Corneal Opacity-<br>Aetiology not<br>established or not<br>reported            | 390 .. 99.00 ..  | ..      | .. | ..       | .. | 7        | .. | 8        | ..  | 8        | .. | 8        | .. | 8        | .. | ..       | .. | 39    |
| TOTAL :                                                                        |                  | 22      | 8  | 48       | 70 | 101      | 93 | 78       | 110 | 84       | 32 | 94       | 40 | 48       | 38 | 15       | 23 |       |
|                                                                                |                  | 30      |    | 118      |    | 194      |    | 188      |     | 116      |    | 134      |    | 86       |    | 38       |    |       |

GENERAL INSTRUCTIONS

| No. | Name             | Age | Sex | Religion     | Occupation |
|-----|------------------|-----|-----|--------------|------------|
| 1   | John Doe         | 25  | M   | Christian    | Farmer     |
| 2   | Jane Smith       | 30  | F   | Protestant   | Teacher    |
| 3   | Robert Brown     | 40  | M   | Catholic     | Engineer   |
| 4   | Mary White       | 20  | F   | Methodist    | Student    |
| 5   | William Black    | 50  | M   | Baptist      | Merchant   |
| 6   | Elizabeth Green  | 35  | F   | Anglican     | Homemaker  |
| 7   | James Grey       | 15  | M   | Presbyterian | Student    |
| 8   | Sarah Hall       | 28  | F   | Quaker       | Writer     |
| 9   | Thomas King      | 60  | M   | Unitarian    | Retired    |
| 10  | Anna Lee         | 45  | F   | Episcopalian | Librarian  |
| 11  | Charles Miller   | 38  | M   | Presbyterian | Doctor     |
| 12  | Frances Nelson   | 22  | F   | Methodist    | Nurse      |
| 13  | George Parker    | 55  | M   | Catholic     | Blacksmith |
| 14  | Harriet Quinn    | 32  | F   | Protestant   | Shopkeeper |
| 15  | Henry Reed       | 48  | M   | Anglican     | Lawyer     |
| 16  | Isabella Scott   | 27  | F   | Baptist      | Musician   |
| 17  | John Taylor      | 18  | M   | Presbyterian | Student    |
| 18  | Katherine Vance  | 33  | F   | Unitarian    | Artist     |
| 19  | Lucas Ward       | 65  | M   | Episcopalian | Retired    |
| 20  | Margaret Young   | 42  | F   | Methodist    | Homemaker  |
| 21  | Nathan Zane      | 58  | M   | Catholic     | Farmer     |
| 22  | Olivia Adams     | 29  | F   | Protestant   | Teacher    |
| 23  | Philip Baker     | 41  | M   | Anglican     | Engineer   |
| 24  | Rebecca Clark    | 24  | F   | Baptist      | Student    |
| 25  | Samuel Evans     | 52  | M   | Presbyterian | Merchant   |
| 26  | Tina Foster      | 36  | F   | Unitarian    | Homemaker  |
| 27  | Victor Grant     | 19  | M   | Episcopalian | Student    |
| 28  | Wendy Harris     | 31  | F   | Methodist    | Writer     |
| 29  | Xavier Ives      | 61  | M   | Catholic     | Retired    |
| 30  | Yvonne Jones     | 44  | F   | Protestant   | Librarian  |
| 31  | Zachary King     | 57  | M   | Anglican     | Lawyer     |
| 32  | Alice Lee        | 26  | F   | Baptist      | Musician   |
| 33  | Bernard Miller   | 17  | M   | Presbyterian | Student    |
| 34  | Christina Nelson | 34  | F   | Unitarian    | Artist     |
| 35  | David Parker     | 63  | M   | Episcopalian | Retired    |
| 36  | Evelyn Quinn     | 43  | F   | Methodist    | Homemaker  |
| 37  | Fred Reed        | 59  | M   | Catholic     | Farmer     |
| 38  | Gladys Scott     | 30  | F   | Protestant   | Teacher    |
| 39  | Harold Taylor    | 46  | M   | Anglican     | Engineer   |
| 40  | Irene Vance      | 23  | F   | Baptist      | Student    |
| 41  | Jack Ward        | 54  | M   | Presbyterian | Merchant   |
| 42  | Karen Zane       | 37  | F   | Unitarian    | Homemaker  |
| 43  | Liam Adams       | 16  | M   | Episcopalian | Student    |
| 44  | Maria Baker      | 39  | F   | Methodist    | Writer     |
| 45  | Nathan Clark     | 64  | M   | Catholic     | Retired    |
| 46  | Olivia Evans     | 47  | F   | Protestant   | Librarian  |
| 47  | Philip Foster    | 56  | M   | Anglican     | Lawyer     |
| 48  | Rebecca Grant    | 25  | F   | Baptist      | Musician   |
| 49  | Samuel Harris    | 14  | M   | Presbyterian | Student    |
| 50  | Tina Ives        | 35  | F   | Unitarian    | Artist     |
| 51  | Victor Jones     | 66  | M   | Episcopalian | Retired    |
| 52  | Wendy King       | 46  | F   | Methodist    | Homemaker  |
| 53  | Xavier Lee       | 62  | M   | Catholic     | Farmer     |
| 54  | Yvonne Miller    | 38  | F   | Protestant   | Teacher    |
| 55  | Zachary Nelson   | 51  | M   | Anglican     | Engineer   |
| 56  | Alice Parker     | 21  | F   | Baptist      | Student    |
| 57  | Bernard Quinn    | 53  | M   | Presbyterian | Merchant   |
| 58  | Christina Reed   | 32  | F   | Unitarian    | Homemaker  |
| 59  | David Scott      | 67  | M   | Episcopalian | Retired    |
| 60  | Evelyn Taylor    | 48  | F   | Methodist    | Homemaker  |
| 61  | Fred Vance       | 60  | M   | Catholic     | Farmer     |
| 62  | Gladys Ward      | 33  | F   | Protestant   | Teacher    |
| 63  | Harold Zane      | 49  | M   | Anglican     | Engineer   |
| 64  | Irene Adams      | 27  | F   | Baptist      | Student    |
| 65  | Jack Baker       | 55  | M   | Presbyterian | Merchant   |
| 66  | Karen Clark      | 36  | F   | Unitarian    | Homemaker  |
| 67  | Liam Evans       | 15  | M   | Episcopalian | Student    |
| 68  | Maria Foster     | 40  | F   | Methodist    | Writer     |
| 69  | Nathan Grant     | 65  | M   | Catholic     | Retired    |
| 70  | Olivia Harris    | 45  | F   | Protestant   | Librarian  |
| 71  | Philip Ives      | 57  | M   | Anglican     | Lawyer     |
| 72  | Rebecca Jones    | 28  | F   | Baptist      | Musician   |
| 73  | Samuel King      | 18  | M   | Presbyterian | Student    |
| 74  | Tina Lee         | 34  | F   | Unitarian    | Artist     |
| 75  | Victor Miller    | 63  | M   | Episcopalian | Retired    |
| 76  | Wendy Nelson     | 44  | F   | Methodist    | Homemaker  |
| 77  | Xavier Parker    | 61  | M   | Catholic     | Farmer     |
| 78  | Yvonne Quinn     | 39  | F   | Protestant   | Teacher    |
| 79  | Zachary Reed     | 52  | M   | Anglican     | Engineer   |
| 80  | Alice Scott      | 24  | F   | Baptist      | Student    |
| 81  | Bernard Taylor   | 41  | M   | Presbyterian | Merchant   |
| 82  | Christina Vance  | 31  | F   | Unitarian    | Homemaker  |
| 83  | David Ward       | 64  | M   | Episcopalian | Retired    |
| 84  | Evelyn Zane      | 43  | F   | Methodist    | Homemaker  |
| 85  | Fred Adams       | 59  | M   | Catholic     | Farmer     |
| 86  | Gladys Baker     | 30  | F   | Protestant   | Teacher    |
| 87  | Harold Clark     | 46  | M   | Anglican     | Engineer   |
| 88  | Irene Evans      | 23  | F   | Baptist      | Student    |
| 89  | Jack Foster      | 54  | M   | Presbyterian | Merchant   |
| 90  | Karen Grant      | 37  | F   | Unitarian    | Homemaker  |
| 91  | Liam Harris      | 16  | M   | Episcopalian | Student    |
| 92  | Maria Ives       | 39  | F   | Methodist    | Writer     |
| 93  | Nathan Jones     | 64  | M   | Catholic     | Retired    |
| 94  | Olivia King      | 47  | F   | Protestant   | Librarian  |
| 95  | Philip Lee       | 56  | M   | Anglican     | Lawyer     |
| 96  | Rebecca Miller   | 25  | F   | Baptist      | Musician   |
| 97  | Samuel Nelson    | 14  | M   | Presbyterian | Student    |
| 98  | Tina Parker      | 35  | F   | Unitarian    | Artist     |
| 99  | Victor Quinn     | 66  | M   | Episcopalian | Retired    |
| 100 | Wendy Reed       | 46  | F   | Methodist    | Homemaker  |

Table XXII-C

## UNILATERAL BLINDNESS PER ONE LAKH OF POPULATION (LENS)

|                                                             |             | 0—10 |   | 11—20 |   | 21—30 |   | 31—40 |     | 41—50 |     | 51—60 |     | 61—70 |     | Above 70 |   | Total |   |
|-------------------------------------------------------------|-------------|------|---|-------|---|-------|---|-------|-----|-------|-----|-------|-----|-------|-----|----------|---|-------|---|
|                                                             |             | M    | F | M     | F | M     | F | M     | F   | M     | F   | M     | F   | M     | F   | M        | F | M     | F |
| Senile Cataract                                             | 411 — 62.21 | —    | — | —     | — | 8     | 8 | 87    | 124 | 160   | 144 | 185   | 142 | 245   | 180 | 89       |   |       |   |
| Recreational Activity                                       |             |      |   |       |   |       |   |       |     |       |     |       |     |       |     |          |   |       |   |
| Cataract Blow or Fall                                       | 411 — 34.08 | 8    | 8 | —     | — | 8     | 8 | —     | —   | 8     | —   | —     | —   | —     | —   | —        | — | —     | — |
| Congenital Cataract                                         | 411 — 89.00 | —    | — | 8     | 8 | —     | — | —     | —   | —     | —   | —     | —   | —     | —   | —        | — | —     | — |
| Occupational Activity                                       |             |      |   |       |   |       |   |       |     |       |     |       |     |       |     |          |   |       |   |
| Cataract (Blow or Fall)                                     | 411 — 31.08 | —    | — | —     | 8 | —     | — | —     | —   | —     | —   | —     | —   | —     | —   | —        | — | —     | — |
| Operated Cataract                                           | 412 — 37.00 | —    | — | —     | — | 8     | — | —     | —   | —     | —   | —     | —   | —     | —   | —        | — | —     | — |
| Senile Cataract (operated)                                  | 412 — 62.21 | —    | — | —     | — | —     | — | 16    | —   | —     | —   | —     | —   | —     | —   | 8        | — | —     | — |
| Cataract Operated assumed senile degeneration               | 412 — 62.22 | —    | — | —     | — | —     | — | —     | —   | 8     | 16  | —     | 8   | —     | —   | —        | — | —     | — |
| Congenital Cataract Operated                                | 412 — 89.00 | —    | — | —     | — | —     | — | —     | —   | —     | —   | —     | —   | —     | —   | 8        | — | —     | — |
| Dislocated lens due to occupational activity                | 420 — 31.19 | —    | — | —     | — | —     | — | 7     | —   | —     | —   | —     | —   | —     | —   | —        | — | —     | — |
| Dislocated lens due to recreational activity not specified  | 420 — 34.19 | —    | — | —     | — | —     | — | —     | 8   | —     | —   | —     | —   | —     | —   | —        | — | —     | — |
| Dislocated lens due to recreational activity (Blow or Fall) | 420 — 34.08 | —    | — | 7     | — | —     | — | —     | —   | —     | —   | —     | —   | —     | —   | —        | — | —     | — |
| Dislocated lens aetiology not established                   | 420 — 99.00 | —    | — | —     | — | —     | — | —     | —   | —     | 16  | —     | —   | —     | —   | —        | — | —     | — |



Table XXII-D

UNILATERAL BLINDNESS PER ONE LAKH POPULATION

UVEA. RETINA. OPTIC PATHWAYS AND VITREOUS

|                |           | 0-10 |   | 11-20 |   | 21-30 |   | 31-40 |   | 41-50 |   | 51-60 |   | 61-70 |   | 70 Total |   |
|----------------|-----------|------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|----------|---|
|                |           | M    | F | M     | F | M     | F | M     | F | M     | F | M     | F | M     | F | M        | F |
| Uvea           |           |      |   |       |   |       |   |       |   |       |   |       |   |       |   |          |   |
| Retina         | 51-99.00  | -    | - | -     | - | -     | - | -     | - | 7     | - | -     | - | -     | - | -        | - |
|                | 660-48.03 | -    | - | -     | - | -     | - | 7     | - | -     | - | -     | - | -     | - | -        | - |
| Optic Pathways | 690-48.03 | -    | - | -     | - | 8     | - | -     | - | -     | - | -     | - | -     | - | -        | - |
|                | 720-21.08 | -    | - | -     | - | -     | - | -     | - | -     | - | -     | - | 8     | - | -        | - |
| Vitreous       | 770-99.00 | -    | - | -     | - | 8     | - | -     | - | -     | - | -     | - | -     | - | -        | - |
|                | 890-89.00 | 8    | - | -     | - | -     | - | -     | - | -     | - | -     | - | -     | - | -        | - |

Table XXII-E

UNILATERAL BLINDNESS PER ONE LAKH POPULATION

SITE — TYPE INDEFINITE

|                                   |     | 0—10 | 11—20 | 21—30 | 31—40 | 41—50 | 51—60 | 61—70 | Above 70 |    |    |    |    |    |    |    |    |
|-----------------------------------|-----|------|-------|-------|-------|-------|-------|-------|----------|----|----|----|----|----|----|----|----|
|                                   |     | M    | F     | M     | F     | M     | F     | M     | F        |    |    |    |    |    |    |    |    |
| Amblyopia                         | 915 | 8    | —     | —     | 32    | 16    | 39    | 8     | 8        | 8  | —  |    |    |    |    |    |    |
| Myopia                            | 958 | —    | —     | —     | —     | —     | —     | —     | —        | —  | —  |    |    |    |    |    |    |
| Cataract in any other combination | 956 | 8    | —     | —     | —     | 16    | —     | 16    | 24       | 8  | 48 | 24 | 14 | 32 | 38 |    |    |
| Glaucoma and Cataract             | 951 | —    | —     | —     | —     | —     | —     | —     | 8        | —  | —  | 8  | —  | —  | —  |    |    |
| Site — Type Indefinite            | 990 | —    | —     | 7     | —     | —     | —     | —     | 8        | —  | —  | —  | —  | —  | —  |    |    |
| TOTAL :                           |     | 16   | —     | 7     | —     | 32    | 32    | 39    | 32       | 32 | 54 | 16 | 48 | 40 | 22 | 32 | 38 |

TABLE : 23  
UNILATERAL BLINDNESS.

|                               | No. of Cases | Percentage.   |
|-------------------------------|--------------|---------------|
| <b>EYE BALL IN GENERAL</b>    |              |               |
| Glaucoma                      | 7            | 1.68          |
| Myopia                        | 2            | 0.48          |
| Phthisis (Atrophic)           | 31           | 7.43          |
| Congenital Anomaly            | 2            | 0.48          |
| <b>TOTAL :</b>                | <b>42</b>    | <b>10.07</b>  |
| <b>CORNEA—SCLERA.</b>         |              |               |
| Corneal Opacity (Small Pox)   | 22           | 5.280         |
| Corneal Ulcer                 | 61           | 14.630        |
| Trachoma                      | 13           | 3.120         |
| Injury                        | 13           | 3.120         |
| Others                        | 7            | 1.680         |
| <b>TOTAL :</b>                | <b>116</b>   | <b>27.830</b> |
| <b>LENS.</b>                  |              |               |
| Cataract Unoperated           | 182          | 43.650        |
| Cataract Operated             | 9            | 2.160         |
| Dislocated and Others         | 6            | 1.440         |
| <b>TOTAL :</b>                | <b>197</b>   | <b>47.250</b> |
| <b>UVEA :</b>                 | <b>1</b>     | <b>0.230</b>  |
| <b>RETINA :</b>               |              |               |
| Macular Degeneration          | 2            | 0.480         |
| <b>VITREOUS :</b>             |              |               |
| Persistent Hyperplasia        | 1            | 0.230         |
| <b>OPTIC ATROPHY</b>          | <b>2</b>     | <b>0.480</b>  |
| <b>SITE—TYPE INDEFINITE :</b> |              |               |
| Cataract and Glaucoma         | 2            | 0.480         |
| Cataract in combination       | 31           | 7.430         |
| Amblyopia                     | 20           | 4.800         |
| Myopic Degeneration           | 1            | 0.230         |
| Unknown                       | 2            | 0.480         |
| <b>TOTAL :</b>                | <b>56</b>    | <b>13.420</b> |

# TABLE 1 SUMMARY

| Age Group                       | M          | 1970-1979 |     |     |     | 1980-1989 |     |     |     |
|---------------------------------|------------|-----------|-----|-----|-----|-----------|-----|-----|-----|
|                                 |            | 1         | 2   | 3   | 4   | 1         | 2   | 3   | 4   |
| 0-10                            | 44         | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| 11-20                           | 17         | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| 21-30                           | ..         | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| 31-40                           | ..         | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| 41-50                           | ...        | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| 51-60                           | ..         | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| 61-70                           | ..         | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| Over 70                         | ..         | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| Out of Total Population (12743) | 61<br>0.91 | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |
| Out of Trauma cases (992)       | 1.65       | 1.1       | 1.0 | 1.0 | 1.0 | 1.1       | 1.0 | 1.0 | 1.0 |



TABLE : 23  
UNILATERAL BLINDNESS.

|                               | No. of Cases | Percentage.   |
|-------------------------------|--------------|---------------|
| <b>EYE BALL IN GENERAL</b>    |              |               |
| Glaucoma                      | 7            | 1.68          |
| Myopia                        | 2            | 0.48          |
| Phthisis (Atrophic)           | 31           | 7.43          |
| Congenital Anomaly            | 2            | 0.48          |
| <b>TOTAL :</b>                | <b>42</b>    | <b>10.07</b>  |
| <b>CORNEA—SCLERA.</b>         |              |               |
| Corneal Opacity (Small Pox)   | 22           | 5.280         |
| Corneal Ulcer                 | 61           | 14.630        |
| Trachoma                      | 13           | 3.120         |
| Injury                        | 13           | 3.120         |
| Others                        | 7            | 1.680         |
| <b>TOTAL :</b>                | <b>116</b>   | <b>27.830</b> |
| <b>LENS.</b>                  |              |               |
| Cataract Unoperated           | 182          | 43.650        |
| Cataract Operated             | 9            | 2.160         |
| Dislocated and Others         | 6            | 1.440         |
| <b>TOTAL :</b>                | <b>197</b>   | <b>47.250</b> |
| <b>UVEA :</b>                 | <b>1</b>     | <b>0.230</b>  |
| <b>RETINA :</b>               |              |               |
| Macular Degeneration          | 2            | 0.480         |
| <b>VITREOUS :</b>             |              |               |
| Persistent Hyperplasia        | 1            | 0.230         |
| <b>OPTIC ATROPHY</b>          | <b>2</b>     | <b>0.480</b>  |
| <b>SITE—TYPE INDEFINITE :</b> |              |               |
| Cataract and Glaucoma         | 2            | 0.480         |
| Cataract in combination       | 31           | 7.430         |
| Amblyopia                     | 20           | 4.800         |
| Myopic Degeneration           | 1            | 0.230         |
| Unknown                       | 2            | 0.480         |
| <b>TOTAL :</b>                | <b>56</b>    | <b>13.420</b> |

T A B L E--XXIV

## TRACHOMA

| Age Group                         | STAGE : I  |            |            |       | STAGE : II  |             |            |        | STAGE : III   |               |               |        | STAGE : IV   |              |               |        | TOTAL (ALL TYPES) |                |               |       |
|-----------------------------------|------------|------------|------------|-------|-------------|-------------|------------|--------|---------------|---------------|---------------|--------|--------------|--------------|---------------|--------|-------------------|----------------|---------------|-------|
|                                   | M          | F          | Total      | %     | M           | F           | Total      | %      | M             | F             | T             | %      | M            | F            | T             | %      | M                 | F              | T             | %     |
| 0—10                              | 44         | 28         | 72         | 1.619 | 411         | 234         | 645        | 14.504 | 765           | 513           | 1278          | 28.738 | 88           | 29           | 117           | 2.630  | 1308<br>(49.86)   | 804<br>(44.07) | 2112          | 47.49 |
| 11—20                             | 17         | 3          | 20         | 0.689 | 156         | 109         | 265        | 9.141  | 727           | 641           | 1368          | 47.188 | 115          | 138          | 253           | 8.727  | 1015<br>(65.86)   | 891<br>(65.61) | 1906          | 65.74 |
| 21—30                             | ..         | 3          | 3          | 0.172 | 14          | 21          | 35         | 2.010  | 334           | 442           | 776           | 44.572 | 107          | 156          | 263           | 15.106 | 455<br>(63.01)    | 622<br>(61.04) | 1077          | 61.86 |
| 31—40                             | ..         | ..         | ..         | ..    | 11          | 4           | 15         | 1.141  | 171           | 261           | 432           | 32.876 | 137          | 197          | 334           | 25.418 | 319<br>(57.68)    | 462<br>(68.70) | 781           | 59.43 |
| 41—50                             | ...        | ..         | ..         | ...   | 1           | 2           | 3          | 0.309  | 103           | 116           | 219           | 22.530 | 150          | 138          | 288           | 29.630 | 254<br>(51.73)    | 256<br>(53.22) | 510           | 52.46 |
| 51—60                             | ..         | ..         | ..         | ..    | ..          | ..          | ...        | ..     | 43            | 38            | 81            | 11.808 | 127          | 117          | 244           | 35.568 | 170<br>(47.35)    | 155<br>(47.40) | 325           | 47.37 |
| 61—70                             | ..         | ...        | ...        | ..    | ..          | ..          | ..         | ..     | 20            | 16            | 36            | 8.035  | 94           | 67           | 161           | 35.937 | 114<br>(45.60)    | 83<br>(41.91)  | 197           | 43.97 |
| Over 70                           | ..         | ..         | ..         | ..    | ...         | ..          | ...        | ..     | 13            | 7             | 20            | 8.475  | 46           | 18           | 64            | 27.119 | 59<br>(39.86)     | 25<br>(28.40)  | 84            | 35.59 |
| % out of total Population (12743) | 61<br>0.91 | 34<br>0.56 | 95<br>0.74 |       | 593<br>8.86 | 370<br>6.10 | 93<br>7.55 |        | 2176<br>32.54 | 2034<br>33.59 | 4210<br>33.03 |        | 864<br>12.92 | 860<br>14.20 | 1724<br>13.52 |        | 3694<br>55.24     | 3298<br>54.45  | 6992<br>54.86 |       |
| %out of Trachoma cases (6992)     | 1.65       | 1.03       | 1.35       |       | 16.05       | 11.21       | 13.77      |        | 58.9          | 61.67         | 60.21         |        | 23.39        | 26.07        | 24.65         |        |                   |                |               |       |



## IN NUTSHELL

The blindness is 69.6% curable and 30.4% incurable. The incurable to curable ratio is maximum in the 3rd decade and it is equal in the 4th decade. Later it falls progressively in various age groups. The preventability of blindness in general is 27.2%. The ratio of unpreventable and preventable goes on rising with age. This is only because of cataract. 3.2% of the total population is blind (2.826% in males and 3.616% in females). The involvement in females is highly significant ( $P < .01$ ). This is because of more curable blindness caused by cataract. (It has been pointed out later that prevalence of cataract is also significantly higher in females). Lenticular opacities as cause of blindness rank first in the list of site type affection and as senile degeneration in the aetiological section. Corneal diseases rank second by site type and infectious diseases rank second considered aetiologically.

Unilateral blindness prevalence is almost same 3.272%. The tendency for this is to rise progressively with age. In causative factors cataract as a cause ranks first and then in order, are corneal opacity, eyeball in general and others. The similarity of general pattern in both the unilateral and bilateral blind is striking.



## CHAPTER VI

### Trachoma

Also called 'Rohe' kukre, is a disease as old as civilisation. In the ancient treatise of Susurata (1000BC), this disease is mentioned. Trachoma being the largest single cause of blindness in the world, lot of work both in the field research and laboratory has been done on this disease.

Till 1955 despite high prevalence of Trachoma in India, no cohesive comparative figures were available. Ursekar (1955) through questionnaire to heads of ophthalmic hospitals constructed a trachoma map of India.

Indian Council of Medical Research was entrusted with the problem of working on trachoma by the Government of India. Trachoma pilot project was the outcome of this. Based on the findings in 15 states by a random sampling technique, Trachoma map was reconstructed. This study further lead on to many scientific publications on epidemiology, (Aggarwal 1963, Shukla 1966, Krishnamoorthy 1966, Gupta 1964,66); technique of diagnosis (Shukla 1966, Nirankari, 1961 etc.) and treatment trials (Aggarwal 1963, Shukla 1964, etc.).

#### Definition

Trachoma is a specific communicable keratoconjunctivitis usually of chronic evolution caused by an agent belonging to Psittacosis-Lymphogranuloma-Trachoma Group (PLT) of atypical viruses and characterised by follicles, papillary hypertrophy, Pannus and in its later stages cicatrization (WHO Tech. Rep. Ser. 235).

#### Criteria of clinical Diagnosis:—

The criteria as adopted by us were based on the second report of the Expert Committee on Trachoma (Tech. Report S. No. 106).

The clinical diagnosis of trachoma required the presence of at least two of the following signs,

- (1) Follicles on the upper tarsal plate, limbal follicles or their sequelae—Herbert's Pits.
- (2) Pannus of more than 2 mm most marked superiorly.
- (3) Epithelial or sub-epithelial keratitis most marked in the upper third of cornea.
- (4) Scars of the characteristic configuration.

The research team carried no laboratory facilities. Trachoma 'O' or 'Dubium' terms were not employed. Under field conditions it becomes extremely difficult to diagnose Trachoma. As such, before giving this label, the diagnosis of TR. 1 was carefully weighed. WHO technical reports and work of Franken et al corroborate this view.

### Prevalence :

The general prevalence is 54.86% as against 76.41% observed by Franken (1968). In the male population we observe this in 55.24% and in the females 54.45%. Corresponding figures from Dry belt are 71.37% and 81.91% respectively (Franken 1968). Figures given for Punjab by National Trachoma Control Programme, (Preobragenski 1964) are 79.1%. In total trachoma cases in our series healed stage is seen in 24.65% while the rest are cases of the active trachoma. Healed stage is observed from the first decade where 2.63% of total population has healed trachoma. 8.787% in the second-decade have healed trachoma and then there is a progressive rise decade-wise (Table 24 fig: 9)

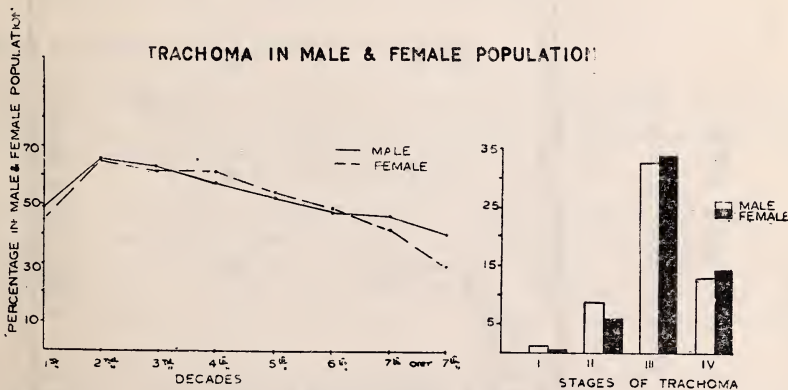


Fig. 9

Third stage shows a progressive rise upto 3rd decade and then shows a fall. 2nd stage rises maximum upto 2nd decade while 1st is maximum in the first decade.

The lower figures encountered by us in total population as compared to those given by Franken from dry belt of Punjab can be explained on the basis of climate, the dry climate being more conducive to trachoma (Gupta 64, Sarkies 67, and others).

For total population examined, 0.74% are having 1st stage of Trachoma, 7.55% 2nd stage, 33.03% 3rd stage and 13.52% 4th stage.

### Trachoma by sex

The general prevalence is almost same in males and females. All the stages are equally distributed in either sex. Females having trachoma

**Table XXV**  
**TRACHOMA SEQUELAE**

| Age group                     | Entropion & Trichiasis |        |       |                     | Xerosis |        |       |      | Total |        |       |       |
|-------------------------------|------------------------|--------|-------|---------------------|---------|--------|-------|------|-------|--------|-------|-------|
|                               | Male                   | Female | Total | %age to group total | Male    | Female | Total | %age | Male  | Female | Total | %age  |
| 0-10                          | 1                      | .....  | 1     | 0.04                | 44      | 7      | 51    | 2.41 | 45    | 7      | 52    | 2.46  |
| 11-20                         | 2                      | .....  | 2     | 0.10                | 33      | 14     | 47    | 2.46 | 35    | 14     | 49    | 2.57  |
| 21-30                         | 3                      | 6      | 9     | 0.83                | 18      | 8      | 26    | 2.41 | 21    | 14     | 35    | 3.24  |
| 31-40                         | 3                      | 15     | 18    | 2.30                | 12      | 4      | 16    | 2.05 | 15    | 19     | 34    | 4.35  |
| 41-50                         | 6                      | 14     | 20    | 3.92                | 13      | 2      | 15    | 2.94 | 19    | 16     | 35    | 6.86  |
| 51-60                         | 6                      | 19     | 25    | 7.69                | 2       | 4      | 6     | 1.84 | 8     | 23     | 31    | 9.53  |
| 61-70                         | 6                      | 8      | 14    | 7.10                | 7       | 1      | 8     | 4.06 | 13    | 9      | 22    | 11.16 |
| Over 70                       | 1                      | 5      | 6     | 7.14                | ...     | 1      | 1     | 1.19 | 1     | 6      | 7     | 8.33  |
|                               | 28                     | 67     | 95    | 1.35                | 129     | 41     | 170   | 2.43 | 157   | 108    | 265   | 3.79  |
| % out of total Trachoma cases |                        |        |       |                     |         |        |       |      |       |        |       |       |
| M (3694)                      |                        |        |       |                     | 3.49    | 1.24   |       |      | 4.25  | 3.27   |       |       |
| F (3298)                      | 0.76                   | 2.03   |       |                     |         |        |       |      |       |        |       |       |



predominate in the survey conducted by Franken in the dry belt of Punjab (1968). Gupta (1964) also observed that trachoma is more prevalent in the females after the age of six years.

### **Trachoma with age**

From 47.49% in the first decade, trachoma rises to 65.74% in the 2nd trachoma decade and then surprisingly there is a progressive fall in the general incidence, both in males and females. The only explanation one can give for this observation is that most of the trachoma cases heal so completely that the foot prints of healing cannot be detected in the field conditions.

Gupta (1964) observed that in Trachoma belt with high prevalence rate the active stage I & II were mainly observed in the first decade. Our findings also reveal that trachoma I and II is present in 16.121% of the population in the 1st decade, 9.830% in the II decade, 2.73% in the III decade, 1.141% in the IV decade and 0.309% in the V decade. Beyond that these stages are not encountered. This means that 42.24% of the persons having Trachoma I and II stages in the 1st decade.

### **Trachoma sequelae (Table 25)**

Entropion, trichiasis and xerosis (including Bitot's spots) are observed in 3.79% of the trachoma affected individuals. In male population this is 4.25% while in the female population it is 3.27%.

Entropion is 1.35% in total (0.76% in the males and 2.13% in the females). The more involvement in females is statistically significant ( $p < .01$ ). This is in spite of the fact that general conjunctivitis is more prevalent in the male population (as can be seen in the chapter on miscellaneous diseases). The general rise in entropion is progressive up to 6th decade.

Presence of xerosis in the trachoma affected persons is almost same upto 6th decade while in the 7th decade the prevalence is on the higher side. In the total male population, the prevalence rate is 3.49% and in the female population, 1.24%. In the total population, it is 2.43%. The higher prevalence rate in the males is statistically significant ( $p < .01$ ).

### **Trachoma sequelae vis-a-vis Bacterial infection and dust particles:—**

It is believed that trachoma by itself leads a comparatively attenuated course with minimal sequelae (Tulsi Dass 1966, Shukla, 66, Rambo, 66, Wood and Dawson 67). Ophthalmias with trachoma have a prolonged course with healing by scarring often leading to trichiasis, entropion, Corneal ulcer & ultimate blindness (Gupta 64). Rambo in his long experience in village service has experienced a considerable fall in the entropion. He feels that prevention of secondary infection make the trachoma innocuous (Rambo 1966). He relies by and large on zinc boric drops in his clinical practice.

All the surgeons engaged in eye relief work feel a decline in the entropion surgery in over 7th decade. Rambo with an experience of 35 years in field work feels, that entropion surgery work has fallen by 75%.



The general incidence of sequelae encountered is detailed already. If the fall in the sequelae is real then these observations can only mean one thing, that the secondary infection rate has considerably decreased.

However, what is intriguing is the fact that prevalence rate of conjunctivitis in males is more than females while entropion is more in females. Hence infection cannot be the only complicating factor, other factors such as carbon and dust may be as important. The role of dust particles has been brought out by Sarkies (1967), who found dust particles in the sub-conjunctival tissues of the eye lids in an appreciable number of cases of trachoma which had progressed to the development of entropion. This can explain higher rate of entropion in females because they work in smoky atmosphere of kitchen, but it cannot explain the lower prevalence in males who work in the fields and are exposed to dust.

### **Trachoma blindness**

Trachomatous blindness is largely due to corneal infection. Some workers lately have started implicating glaucoma in trachoma (Nema 1964) but the evidence is meagre so far. The various ways in which trachoma can cause corneal changes are:

- i. Pannus as such. It is very rarely that pannus is seen to extend up to pupil to block vision. General method by which this factor can contribute is by corneal vascularisation.
- ii. The commonest mode of production of corneal blindness by trachoma is following trichiasis and entropion. By constant rubbing of the eye lashes the ulceration results. It is possible that uneven surface of lid conjunctiva may be causing corneal damage in the same way.

In the chapter on corneal opacity we find a large number of opacities where no definite cause could be implicated. They are thought to be due to conjunctival irregularity and subsequently rubbing and slow scarring. The general appearance is too diffuse to label them as post-ulcerative

- By and large the ophthalmologists feel that it is not trachoma per se but trachoma with secondary infection which is more sinister in causing damage. It appears that the real cause for trachomatous blindness is the secondary infection which in turn is an index of ocular hygiene and living standard. N. T. C. P. reported that about 0.57 million people are economically blind because of trachoma (Gupta 1964). This figure is derived from population of 355 million. We find that trachomatous blindness is 0.408% of the total population examined.

### **Trachoma and customs**

Awasthy et al (1966) have written a commendable paper on the role of "Kajal and surma" on various eye diseases. The methods of preparation with ingredients in the indigenous preparations date back to the oldest medical literature. Kajal is an oily preparation of carbon while the surma has many variable ingredients and many brands are available. Mostly it is

patronised by the persons dealing with the indigeneous system of medicine. Quite a few persons make it at home for themselves. In the process of grinding various ingredients, many particles are bound to remain as such. While Kajal causes irritational watering because of oil, the latter produces the same result by the irritation from particles which is mechanical in nature. It also produces chemical irritation because of its ingredients. These preparations are believed to serve the twin purpose of 'cosmetics' and 'medicines'. The ill effects seem to be four fold.

1. Irritational-chemical and mechanical
2. Using the same salai (rod) for all members in the family has the inherent danger of carrying infection. Whether trachcma is also carried as such remains a conjecture, but a strong possibility.
3. Possible blockage of punctum by carbon.
4. Possible danger of sensitisation.

Though it still remains to be proved whether we really carry trachoma virus with the salai or rod, but all the same it remains a strong possibility. The real danger from their use may be emanating from the irritational properties they have, but with superadded factor of the drugs being infected as such. because no such aseptic precautions are taken during preparation they act both as traumatizing agents and infective agents. Believing the micro trauma concept of Precbragenski and Gupta (1964) the road for a full fledged picture of trachcma to appear is openuncitival These authors implicate dust in trachcma as causing micro-trauma to conjunctival epithelium and thus increasing susceptibility to trachcma and other bacterial infections.

# CHAPTER VII

## Corneal Opacities

Corneal opacities are encountered in 4.51% in the total population. This is as against 11.83% reported by Franken (1968) and 7.46% reported by Agarwal (1967).

Prevalence by age and sex :—

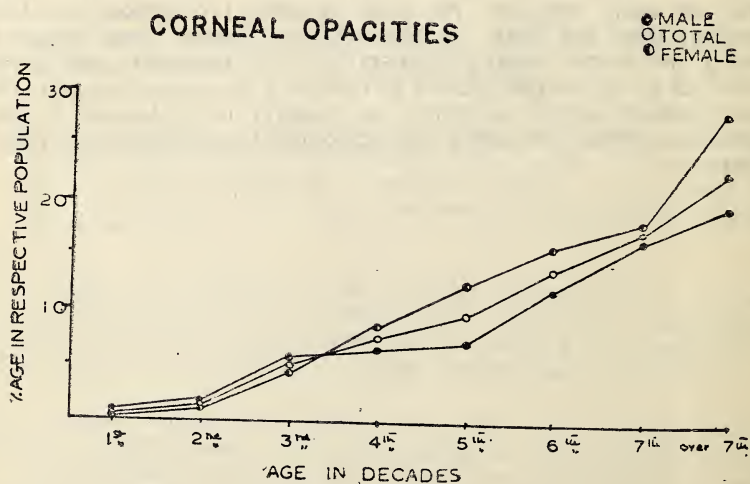


Fig. 10

General figures for males and females as compared with those available from other workers are as follows.

|                | Males   | Females | Total   |               |
|----------------|---------|---------|---------|---------------|
| Franken (1968) | 13.83%‡ | 9.71%‡  | 11.83%‡ | ( $p < .01$ ) |
| Agarwal (1967) | 6.55%‡  | 8.44%‡  | 7.46%‡  | ( $p < .01$ ) |
| Ours           | 3.90%   | 5.18%   | 4.51%   | ( $p < .01$ ) |

‡(Figures are derived from the data given by the authors.)

TABLE XXIV  
CORRELATION OF AGE

| Age Group                       | Male | Female | Total |
|---------------------------------|------|--------|-------|
| 0-10                            | 100  | 100    | 100   |
| 11-20                           | 100  | 100    | 100   |
| 21-30                           | 100  | 100    | 100   |
| 31-40                           | 100  | 100    | 100   |
| 41-50                           | 100  | 100    | 100   |
| 51-60                           | 100  | 100    | 100   |
| 61-70                           | 100  | 100    | 100   |
| Over 70                         | 100  | 100    | 100   |
| Total :                         | 100  | 100    | 100   |
| % in Male and female population | 100  | 100    | 100   |
| % out of 575                    | 100  | 100    | 100   |

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Prevalence by age and sex :—

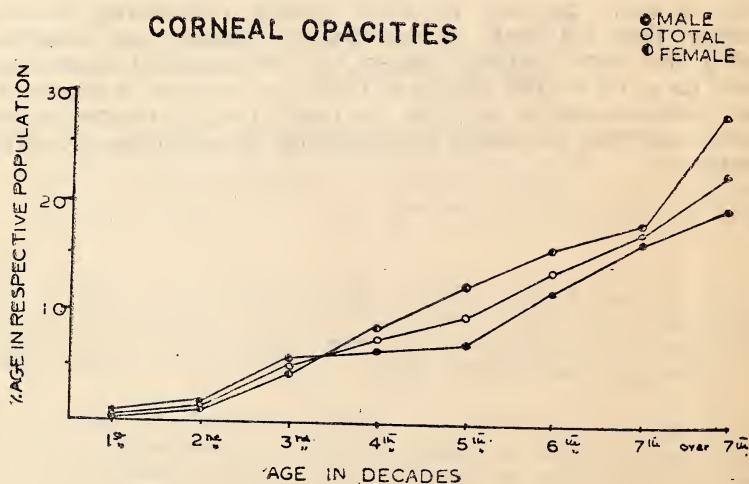


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| Agarwal (1967) | 6.55%‡  | 8.44%‡  | 7.46%‡  | ( $p < .01$ ) |
| Ours           | 3.90%   | 5.18%   | 4.51%   | ( $p < .01$ ) |

‡(Figures are derived from the data given by the authors.)

TABLE XXVI  
CORNEAL OPACITY

| Age Group                       | Trachoma |      |     | Ulcer   |      |       | Injury  |      |      | Surgery |      |       | Dystrophy |      |      | Small Pox |      |      | Miscellaneous |      |       | Total |       | Grand Total |
|---------------------------------|----------|------|-----|---------|------|-------|---------|------|------|---------|------|-------|-----------|------|------|-----------|------|------|---------------|------|-------|-------|-------|-------------|
|                                 | M        | F    | T   | M       | F    | T     | M       | F    | T    | M       | F    | T     | M         | F    | T    | M         | F    | T    | M             | F    | T     | M     | F     |             |
| 0—10                            | 2        | 1    | 3   | 2       | 1    | 3     | 2       | 5    | 7    | ...     | ..   | ..    | ..        | ..   | ..   | ..        | ...  | ...  | 5             | ..   | 5     | 11    | 7     | 18          |
| 11—20                           | 3        | 2    | 5   | 5       | 6    | 11    | 4       | 1    | 5    | ...     | ..   | ..    | ...       | ..   | ..   | 2         | 3    | 5    | 8             | 7    | 15    | 2.41  | 0.38  | 0.40        |
| 21—30                           | 13       | 9    | 22  | 8       | 11   | 19    | 1       | 2    | 3    | ...     | ...  | ..    | ..        | ..   | ..   | 2         | 5    | 7    | 16            | 21   | 37    | 1.42  | 1.39  | 1.41        |
| 31—40                           | 8        | 24   | 32  | 11      | 15   | 26    | 1       | 2    | 3    | ..      | ..   | ..    | ...       | ..   | ..   | 3         | 2    | 5    | 15            | 23   | 38    | 40    | 48    | 88          |
| 41—50                           | 5        | 17   | 22  | 10      | 6    | 16    | 2       | 4    | 6    | ...     | ..   | ...   | ...       | ...  | ..   | 1         | 1    | 2    | 18            | 33   | 51    | 5.54  | 4.71  | 50.5        |
| 51—60                           | 5        | 15   | 20  | 5       | 4    | 9     | 7       | ..   | 7    | ...     | 1    | 1     | ..        | 1    | 1    | 6         | 2    | 8    | 21            | 29   | 50    | 381   | 66    | 10          |
| 61—70                           | 8        | 13   | 21  | 5       | 8    | 13    | 2       | 1    | 3    | 1       | ...  | 1     | ...       | ..   | ..   | 1         | 1    | 2    | 24            | 13   | 37    | 6.87  | 8.67  | 7.91        |
| Over 70                         | 5        | 8    | 13  | ..      | ..   | ..    | 2       | ..   | 2    | 2       | 1    | 3     | ..        | ..   | ..   | ...       | ...  | ...  | 20            | 16   | 36    | 7.33  | 12.68 | 9.97        |
|                                 |          |      |     |         |      |       |         |      |      |         |      |       |           |      |      |           |      |      |               |      |       | 44    | 52    | 96          |
|                                 |          |      |     |         |      |       |         |      |      |         |      |       |           |      |      |           |      |      |               |      |       | 12.25 | 15.92 | 13.99       |
|                                 |          |      |     |         |      |       |         |      |      |         |      |       |           |      |      |           |      |      |               |      |       | 41    | 36    | 7.7         |
|                                 |          |      |     |         |      |       |         |      |      |         |      |       |           |      |      |           |      |      |               |      |       | 16.40 | 18.18 | 17.18       |
|                                 |          |      |     |         |      |       |         |      |      |         |      |       |           |      |      |           |      |      |               |      |       | 29    | 25    | 54          |
|                                 |          |      |     |         |      |       |         |      |      |         |      |       |           |      |      |           |      |      |               |      |       | 19.89 | 28.40 | 22.88       |
| Total :                         | 49       | 89   | 138 | 46      | 51   | 97    | 21      | 15   | 36   | 3       | 2    | 5     | .....     | 1    | 1    | 15        | 14   | 29   | 127           | 142  | 269   | 261   | 314   | 575         |
| % in Male and female population | 0.73     | 1.47 |     | 0.69    | 0.84 |       | 0.31    | 0.25 |      | 0.44    | .033 |       | ..        | .016 |      | .022      | .023 |      | 1.90          | 2.34 |       | 3.90  | 5.18  | 4.51        |
| % out of 575                    |          |      | 24  |         |      | 16.86 |         |      | 6.26 |         |      | 0.869 |           |      | 0.17 |           |      | 5.04 |               |      | 46.78 |       |       |             |
|                                 | p < .01  |      |     | p > .05 |      |       | p > .05 |      |      | p > .05 |      |       | p > .05   |      |      | p > .05   |      |      | p < .05       |      |       |       |       |             |

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|-------|-----|-----|-------|-----|-----|-------|-----|------|-------|
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| 1     | 2   | 3   | 4     | 5   | 6   | 7     | 8   | 9    | 10    |
| 11    | 12  | 13  | 14    | 15  | 16  | 17    | 18  | 19   | 20    |
| 21    | 22  | 23  | 24    | 25  | 26  | 27    | 28  | 29   | 30    |
| 31    | 32  | 33  | 34    | 35  | 36  | 37    | 38  | 39   | 40    |
| 41    | 42  | 43  | 44    | 45  | 46  | 47    | 48  | 49   | 50    |
| 51    | 52  | 53  | 54    | 55  | 56  | 57    | 58  | 59   | 60    |
| 61    | 62  | 63  | 64    | 65  | 66  | 67    | 68  | 69   | 70    |
| 71    | 72  | 73  | 74    | 75  | 76  | 77    | 78  | 79   | 80    |
| 81    | 82  | 83  | 84    | 85  | 86  | 87    | 88  | 89   | 90    |
| 91    | 92  | 93  | 94    | 95  | 96  | 97    | 98  | 99   | 100   |
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| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
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| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 1900  |     |     | 1901  |     |     | 1902  |     |      | Total |
| 190   |     |     |       |     |     |       |     |      |       |

Females show significantly high prevalence ( $p < .01$ ) in our series and in that of Aggarwal. In the study of Franken males are significantly more affected. The reason for this involvement in their series is not given. The aetiological factors encountered by us are given latter. As shown in table 26, corneal opacity was seen in all age groups but the maximum number of cases encountered were in people beyond 7th decade. The incidence of corneal opacity was seen to increase with age progressively starting from first decade (0.40%) to beyond 7th decade where it was 23.881%. While its incidence in the other decade was 0.40% in the first decade, 1.41% in the 2nd decade, 5.05% in the 3rd decade, 7.91% in the 4th decade, 9.97% in the 5th decade, 13.99% in the 6th decade and 17.18% in the 7th decade. Looking at the above figures we find that the incidence of corneal opacity is double in the 7th decade (17.18%) as compared to the 5th decade (9.97%).

Barring first three decades, females are more involved than the males. In the 1st decade, males are 0.41%, females 0.38%, in 2nd decade males 1.42% and females 1.39%, in 3rd decade males 5.54% and females 4.71%. Beyond 3rd decade the pattern is reversed and females take the lead i.e. in 4th decade 6.87% males & 8.67% females, in the 5th decade 7.33% males and 12.68% females, in 6th decade 12.25% males and 15.92% females, in 7th decade 16.40% males and 18.18% females while in the age group of over 70 years males are 19.59% and females 28.40%. (Table 27)

#### **Type of corneal opacity:—**

To classify various types of corneal opacities they were divided into five sub-groups i.e. nebular, macular, leucomatous, adherent leucoma and anterior staphyloma. Aggarwal et al (1966) have also classified their cases of corneal opacity on similar pattern. As the table (28) shows, the macular type of corneal opacity is encountered in the maximum number of cases i. e. 42.78% while the nebular type of opacity is seen in 27.82%. Leucoma, adherent leucoma and anterior staphyloma are encountered in 18.60%, 8.34% and 2.43% respectively. Macular corneal opacity is seen maximum over 7th decade (8.474%). While our series show adherent leucoma in 8.34%. Franken et al (1968) report this in 12% in their report from the dry belt. Macular opacity from the dry belt is 42% and our figures are comparable 42.78%.

More prevalence in the females is at the cost of nebular and macular opacity. These are more in the females as compared to the males. In the case of nebular opacity the difference is highly significant ( $p < .01$ ) while in the case of macular opacity it is comparatively less significant ( $p < .05$ ). Leucoma adherent and anterior staphyloma do not show any sex predilection.

#### **Prevalence of corneal opacity by aetiology:— (Fig. 11)**

To arrive at a particular diagnosis regarding the aetiology of the corneal opacity was particularly problematic in our series. As the rural population is mostly uneducated and not very particular about their eyes, to extract the



Table XXVII

## CORNEAL OPACITY

| Age Group                  | TRACHOMA |        |       | MISCELLANEOUS |        |       | COMBINED TOTAL                             |        |       |                                  |
|----------------------------|----------|--------|-------|---------------|--------|-------|--------------------------------------------|--------|-------|----------------------------------|
|                            | Male     | Female | Total | Male          | Female | Total | Male                                       | Female | Total | %male %Fem. Total %age           |
| 0-10                       | 2        | 1      | 3     | 5             | —      | 5     | 7                                          | 1      | 8     | 0.260 0.050 0.179                |
| 11-20                      | 3        | 2      | 5     | 8             | 7      | 15    | 11                                         | 9      | 20    | 0.713 0.662 0.689                |
| 21-30                      | 13       | 9      | 22    | 16            | 21     | 37    | 29                                         | 30     | 59    | 4.016 2.944 3.388                |
| 31-40                      | 8        | 24     | 32    | 15            | 23     | 38    | 23                                         | 47     | 70    | 4.159 6.176 5.327                |
| 41-50                      | 5        | 17     | 22    | 18            | 33     | 51    | 23                                         | 50     | 73    | 4.684 10.395 7.510               |
| 51-60                      | 5        | 15     | 20    | 21            | 29     | 50    | 26                                         | 44     | 70    | 7.242 13.455 10.204              |
| 61-70                      | 8        | 13     | 21    | 24            | 13     | 37    | 32                                         | 26     | 58    | 12.800 13.131 12.946             |
| Over 70                    | 5        | 8      | 13    | 20            | 16     | 36    | 25                                         | 24     | 49    | 16.891 27.272 20.762             |
| Total                      | 49       | 89     | 138   | 127           | 142    | 269   | 176                                        | 231    | 407   | 176 231 407<br>2.631 3.814 3.194 |
| %age out of 12,743         | 1.083%   |        |       | 2.111 %       |        |       |                                            |        |       |                                  |
| Out of Corneal Opacity 407 | 33.906%  |        |       | 66.09%        |        |       | Females suffer more frequently. $P < 0.01$ |        |       |                                  |

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21—30

31—40

41—50

51—60

61—70

Over 70

Total :

% Out of  
total  
575 cases  
of corneal  
opacity

Table XXVII

## CORNEAL OPACITY

| Age Group                  | TRACHOMA |        |       | MISCELLANEOUS |        |       | COMBINED TOTAL                             |        |       |                        |
|----------------------------|----------|--------|-------|---------------|--------|-------|--------------------------------------------|--------|-------|------------------------|
|                            | Male     | Female | Total | Male          | Female | Total | Male                                       | Female | Total | %male %Fem. Total %age |
| 0-10                       | 2        | 1      | 3     | 5             | —      | 5     | 7                                          | 1      | 8     | 0.260 0.050 0.179      |
| 11-20                      | 3        | 2      | 5     | 8             | 7      | 15    | 11                                         | 9      | 20    | 0.713 0.662 0.689      |
| 21-30                      | 13       | 9      | 22    | 16            | 21     | 37    | 29                                         | 30     | 59    | 4.016 2.944 3.388      |
| 31-40                      | 8        | 24     | 32    | 15            | 23     | 38    | 23                                         | 47     | 70    | 4.159 6.176 5.327      |
| 41-50                      | 5        | 17     | 22    | 18            | 33     | 51    | 23                                         | 50     | 73    | 4.684 10.395 7.510     |
| 51-60                      | 5        | 15     | 20    | 21            | 29     | 50    | 26                                         | 44     | 70    | 7.242 13.455 10.204    |
| 61-70                      | 8        | 13     | 21    | 24            | 13     | 37    | 32                                         | 26     | 58    | 12.800 13.131 12.946   |
| Over 70                    | 5        | 8      | 13    | 20            | 16     | 36    | 25                                         | 24     | 49    | 16.891 27.272 20.762   |
| Total                      | 49       | 89     | 138   | 127           | 142    | 269   | 176                                        | 231    | 407   | 176 231 407            |
| %age out of 12,743         | 1.083%   |        |       | 2.111 %       |        |       | 2.631 3.814 3.194                          |        |       |                        |
| Out of Corneal Opacity 407 | 33.906%  |        |       | 66.09%        |        |       | Females suffer more frequently. $P < 0.01$ |        |       |                        |

TABLE—XXVIII  
CORNEAL OPACITY (*Both Blocks*)

| Age Group                                   | Nebular                     |    |     |       | Macular                     |     |     |       | Leucoma                     |    |     |       | Adh. Leucoma         |    |    |       | Ant. Staphyloma            |    |    |       | Total |     |     |        |
|---------------------------------------------|-----------------------------|----|-----|-------|-----------------------------|-----|-----|-------|-----------------------------|----|-----|-------|----------------------|----|----|-------|----------------------------|----|----|-------|-------|-----|-----|--------|
|                                             | M                           | F  | T   | %     | M                           | F   | T   | %     | M                           | F  | T   | %     | M                    | F  | T  | %     | M                          | F  | T  | %     | M     | F   | T   | %      |
| 0—10                                        | 3                           | 3  | 6   | 0.134 | 5                           | 3   | 8   | 0.179 | 1                           | 1  | 2   | 0.040 | 1                    | —  | 1  | 0.022 | 1                          | ix | 1  | 0.022 | 11    | 7   | 18  | 0.404  |
| 11—20                                       | 7                           | 4  | 11  | 0.379 | 7                           | 7   | 14  | 0.482 | 4                           | 5  | 9   | 0.310 | 3                    | 2  | 5  | 0.172 | 1                          | 1  | 2  | 0.068 | 22    | 19  | 41  | 1.414  |
| 21—30                                       | 13                          | 16 | 29  | 1.665 | 19                          | 22  | 41  | 2.354 | 4                           | 6  | 10  | 0.574 | 4                    | 3  | 7  | 0.402 | —                          | 1  | 1  | 0.057 | 40    | 48  | 88  | 3.054  |
| 31—40                                       | 11                          | 22 | 33  | 2.511 | 15                          | 26  | 41  | 3.120 | 7                           | 10 | 17  | 1.293 | 5                    | 7  | 12 | 0.913 | —                          | 1  | 1  | 0.076 | 38    | 66  | 104 | 7.914  |
| 41—50                                       | 8                           | 20 | 28  | 2.880 | 18                          | 24  | 42  | 4.320 | 6                           | 14 | 20  | 2.057 | 3                    | 2  | 5  | 0.514 | 1                          | 1  | 2  | 0.205 | 36    | 61  | 97  | 9.979  |
| 51—60                                       | 10                          | 14 | 24  | 3.498 | 20                          | 28  | 48  | 6.997 | 7                           | 7  | 14  | 2.040 | 7                    | 2  | 9  | 1.311 | —                          | 1  | 1  | 0.145 | 44    | 52  | 96  | 13.994 |
| 61—70                                       | 7                           | 9  | 16  | 3.571 | 20                          | 12  | 32  | 7.142 | 10                          | 9  | 19  | 4.241 | 3                    | 3  | 6  | 1.339 | 1                          | 3  | 4  | 0.892 | 41    | 36  | 77  | 17.187 |
| Over 70                                     | 8                           | 5  | 13  | 5.508 | 10                          | 10  | 20  | 8.474 | 10                          | 6  | 16  | 6.779 | —                    | 3  | 3  | 1.271 | 1                          | 1  | 2  | 0.847 | 29    | 25  | 54  | 22.881 |
| Total :                                     | 67                          | 93 | 160 |       | 114                         | 132 | 246 |       | 49                          | 58 | 107 |       | 26                   | 22 | 48 |       | 5                          | 9  | 14 |       | 261   | 314 | 575 |        |
| % Out of total 575 cases of corneal opacity | 27.826<br>( $p \leq 0.01$ ) |    |     |       | 42.782<br>( $p \leq 0.05$ ) |     |     |       | 18.608<br>( $p \geq 0.95$ ) |    |     |       | 8.343<br>( $p = 1$ ) |    |    |       | 2.430<br>( $p \geq 0.05$ ) |    |    |       |       |     |     |        |



Table XXVII

causal agent of the opacity from the history is a difficult job. That is the reason why in table (26) we find 46.78% of the cases in the miscellaneous group which includes undetermined causes. Most of the persons affected with corneal opacity are not sure as to what caused the opacity e. g. injury, ulcer etc. and so a definite aetiology could not be established in them.

In our series, after the miscellaneous group trachoma ranked as first in the causation of corneal opacity, showing that one fourth of opacities (24%)

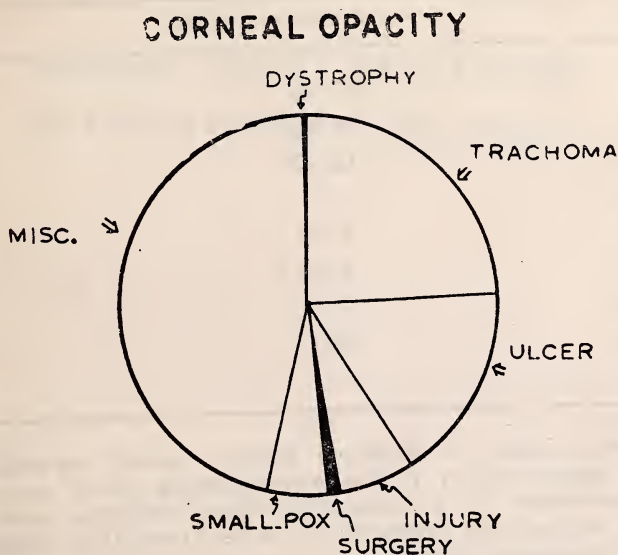


Fig: 11

are due to trachoma. If we combine the trachoma and miscellaneous group, (Table 27) we find that more than 70% of the corneal opacities were due to these combined agents. Out of a total of 407 cases from these two groups i.e. Trachoma and miscellaneous, 43.906% were due to the former and 66.093% due to the latter. Trachoma was responsible for corneal opacity in 1.083% in general population examined, while for the miscellaneous group the figure is 2.111%. We find here that the incidence of corneal opacity increases progressively with age and that females suffer more than males (3.814% and 2.631% respectively) and that this difference is statistically significant ( $p < .01$ ).

Thrashing out corneal opacity further aetiologically, we find corneal ulcer as next factor taking 16.86% out of the corneal opacity cases. People being agriculturists and due to poor medical aid, corneal ulcer and trauma are responsible in 16.86% and 6.26% of cases, Surgical trauma is responsible in 0.869% while corneal dystrophy in 0.17%. Smallpox is

responsible for corneal opacity in 5.04% cases and though the disease has not remained so rampant now but it is not completely eradicated all the same. (Fig. 11)

The maximum number of cases were seen in the 6th decade.

Our figures as compared with those of Franken are as follows:—

**Table 29**

|               | Franken (1968) | Ours  |
|---------------|----------------|-------|
| Trachoma      | 37.68          | 24.00 |
| Trauma        | 16.95          | 6.26  |
| Corneal ulcer | 12.25          | 16.86 |
| Ophthalmia    | 11.17          | —     |
| Small pox     | 8.08           | 5.04  |
| Iatrogenic    | 6.79           | 0.86  |
| Dystrophies   | 3.37           | 0.17  |
| Unspecified   | 3.81           | —     |
| Miscl.        | —              | 46.78 |

As apparent from the table our figures, except the ulcer, are on the lower side. Corneal opacity in the miscellaneous group seems to be an after math of trachoma. In a community where trachoma is so rampant it is very difficult to diagnose dystrophy in the field conditions unless, however, it is of a very characteristic type.

Taking sex wise, trachoma as a cause of corneal opacity is more in females (significant  $p < .01$ ) (Fig. 12). This may be because sequelae of trachoma are more in females as compared to males as pointed out earlier. Ulcer, injury, surgery, dystrophy and small pox have no sex predilection ( $p > .05$ ). Miscellaneous group is also more significant in females ( $p < .05$ ). This lends support to our suspicion that most of the cases put in the miscellaneous group are because of trachoma, even though trachoma could not be directly implicated. It was only for this reason that trachoma and miscellaneous group are combined in table 27. The general impression is that the opacities may be indicative of a more or less suffocated cornea; where trachoma does play some role. It may not be improper to label these cases as of 'secondary dystrophy'.

Out of total cases, 57.91% were unilateral while 42.09% bilateral.

#### **Corneal opacity and visual acuity.**

Visual acuity is assessed according to the pattern shown in Table 30. Out of a total of 575 cases of corneal opacity 151 cases (26.26%) are

having vision less than '6/60 in both eyes'. In 88 patients pathology is only corneal, while in 63 some other associated pathology e.g. lens changes etc. are also present. This group of economic blindness shows maximum number of patients, (26.26%) 20.17% of persons examined for cornea opacity are having vision better than 6/18 in both eyes, 20% having vision upto 6/18 in one eye and 6/60 or less in other eye; 16% are having vision upto 6/18 in one eye and 6/24-6/36 in other eye, while 10.6% are having 6/24-6/36 vision in one eye and 6/60 or less in the other eye. Patients having equal vision (6/24-6/36) in both eyes were 5.57% and it was not possible to check vision in 1.39% cases.

### CORNEAL OPACITY BY AETIOLOGY IN MALE & FEMALE POPULATION

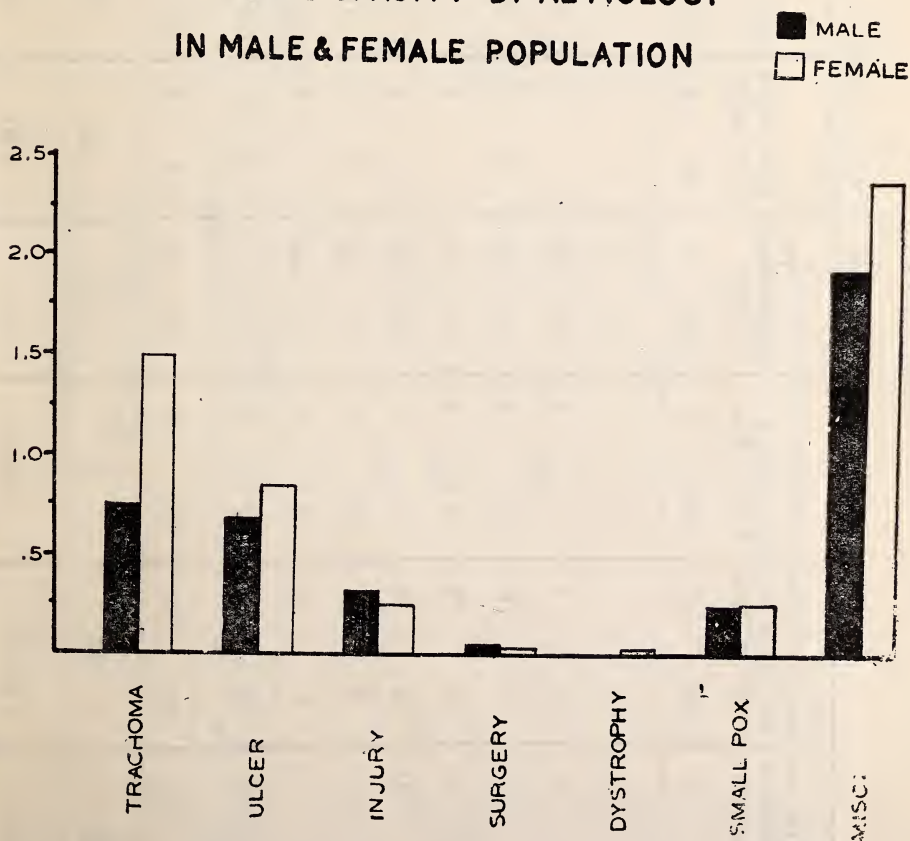


Fig. 12

In 176 cases blindness is unilateral while in 151 it is bilateral. (Table 31). Thus in general population 2.57% of the persons need keratoplasty. Even excluding a large chunk of those where this is contraindicated the magnitude of the problem is huge.



Table XXX

## VISUAL ACUITY IN CORNEAL OPACITY CASES

| Age Group | Upto 6/18 one eye other eye 6/24-6/36 |    | Upto 6/18 one eye other eye 6/60 or less |    | 6/24-6/36 one eye other eye 6/60 or less |     | Both eyes better than 6/18 |     | Both eyes 6/24-6/36 |     | 6/60 or less both eyes |    | Not possible |     | Total |     |
|-----------|---------------------------------------|----|------------------------------------------|----|------------------------------------------|-----|----------------------------|-----|---------------------|-----|------------------------|----|--------------|-----|-------|-----|
|           | M                                     | F  | M                                        | F  | M                                        | F   | M                          | F   | M                   | F   | M                      | F  | M            | F   | M     | F   |
| 0-10      | ...                                   | 1  | 3                                        | 1  | 1                                        | ... | 4                          | 1   | ...                 | ... | 1                      | 1  | 2            | 3   | 11    | 7   |
| 11-20     | 3                                     | 5  | 10                                       | 5  | 1                                        | 2   | 6                          | 6   | ...                 | ... | 1                      | 1  | 1            | ... | 22    | 19  |
| 21-30     | 11                                    | 11 | 7                                        | 16 | 2                                        | 4   | 16                         | 12  | 2                   | 2   | 2                      | 3  | ...          | ... | 40    | 48  |
| 31-40     | 9                                     | 6  | 13                                       | 12 | 2                                        | 5   | 10                         | 27  | 2                   | 4   | 2                      | 12 | ...          | ... | 38    | 66  |
| 41-50     | 10                                    | 10 | 10                                       | 9  | 4                                        | 5   | 5                          | 12  | 2                   | 4   | 4                      | 21 | 1            | ... | 36    | 61  |
| 51-60     | 7                                     | 7  | 8                                        | 8  | 8                                        | 9   | 8                          | 2   | 3                   | 7   | 10                     | 19 | ...          | ... | 44    | 52  |
| 61-70     | 4                                     | 3  | 6                                        | 3  | 5                                        | 5   | 2                          | 4   | 2                   | 3   | 22                     | 18 | ...          | ... | 41    | 36  |
| Over 70   | 2                                     | 3  | 2                                        | 2  | 3                                        | 5   | 1                          | ... | 1                   | ... | 20                     | 14 | ...          | 1   | 29    | 25  |
| Total     | 46                                    | 46 | 59                                       | 56 | 26                                       | 35  | 52                         | 64  | 12                  | 20  | 62                     | 9  | 4            | 45  | 261   | 314 |
| Male      |                                       |    |                                          |    |                                          |     |                            |     |                     |     |                        |    |              |     |       |     |
| Female    | 92                                    |    | 115                                      |    | 61                                       |     | 116                        |     | 32                  |     | 151                    |    | 8            |     | 575   |     |
| %age      | 16.00                                 |    | 20.00                                    |    | 10.60                                    |     | 20.17                      |     | 5.57                |     | 26.26                  |    | 1.39         |     |       |     |

Table XXXI

## CORNEAL OPACITY

| Age Group | B I L A T E R A L |        | P e r c e n t a g e |        | U N I L A T E R A L |        | P e r c e n t a g e |        | A L L T Y P E S |               | P e r c e n t a g e |
|-----------|-------------------|--------|---------------------|--------|---------------------|--------|---------------------|--------|-----------------|---------------|---------------------|
|           | Male              | Female | Male                | Female | Male                | Female | Male                | Female | Male            | Female        |                     |
| 0-10      | 1                 | 3      | 4                   |        | 10                  | 4      | 14                  |        | 11<br>(0.41)    | 7<br>(0.38)   | 18<br>0.400         |
| 11-20     | 7                 | 3      | 10                  |        | 15                  | 16     | 31                  |        | 22<br>(1.42)    | 19<br>(1.39)  | 41<br>1.410         |
| 21-30     | 11                | 18     | 29                  |        | 29                  | 30     | 59                  |        | 40<br>(5.54)    | 48<br>(4.71)  | 88<br>5.050         |
| 31-40     | 11                | 29     | 40                  |        | 27                  | 37     | 64                  |        | 38<br>(6.87)    | 66<br>(8.67)  | 104<br>7.910        |
| 41-50     | 8                 | 35     | 43                  |        | 28                  | 26     | 54                  |        | 36<br>(7.33)    | 61<br>(12.68) | 97<br>9.970         |
| 51-60     | 20                | 27     | 47                  |        | 24                  | 25     | 49                  |        | 44<br>(12.25)   | 52<br>(15.92) | 96<br>13.990        |
| 61-70     | 18                | 21     | 39                  |        | 23                  | 15     | 38                  |        | 41<br>(16.40)   | 36<br>(18.18) | 77<br>17.180        |
| Over 70   | 14                | 16     | 30                  |        | 15                  | 9      | 24                  |        | 29<br>(19.59)   | 25<br>(28.40) | 54<br>22.88         |
|           | 90                | 152    | 242                 |        | 171                 | 162    | 333                 |        |                 |               |                     |
|           |                   |        |                     |        | 42.09               |        | 57.91               |        |                 |               |                     |

## CHAPTER VIII

### Cataract and Aphakia

Wide variation of figures of prevalence exist as noted by different authors.

Fuch's (1960) cites Cooper as giving the following figures.

|               |       |         |       |
|---------------|-------|---------|-------|
| Bombay        | 5%    | Bihar   | 50.8% |
| Bhiwani (Pb.) | 16.6% | Madras  | 4.1%  |
| Amritsar      | 7.8%  | Delhi   | 3.5%  |
| Lucknow       | 2.8%  | Indore  | 5.0%  |
| Assam         | 2.7%  | Sitapur | 10.1% |
| Jaipur        | 4.8%  |         |       |

These have been evaluated from Hospital questionnaire. For having a general idea of the needs of community these figures can be misleading because they are always biased.

Franken (1968), Chatterjee (1968) and Aggarwal (1966 & 67) are some of the workers who have given figures out of surveys. In some studies it was the paramedical staff whose help was utilised for survey work.

#### Data Analysis

Congenital cataract and traumatic cataract were not excluded from this study as was done by Franken et al (1968). These cases were studied as individuals and not as eyes affected e. g. a patient with bilateral cataract was taken as one and so was a patient with unilateral cataract.

#### Prevalence (Fig. 13)

In all 10.484% of the total population have cataract and aphakia combined over 7th decade. This is 100%. In the first three decades it is 0.179%, 0.206% and 0.804%. Then onwards there is sudden rise from 0.804% to 5.936%, a rise of about six times, then from 4th to 5th decade it rise to 27.366%, a 4.5 times rise. In the sixth decade it is 54.373% and 79.241% in the 7th decade (Table 32).

The contribution, to this, of only aphakes (either bilateral aphakes or unilateral aphakes having no cataract on the other side) is 0.022%

Table XXXII

## CATARACT AND APHAKIA

| Age Group | M A L E                         |                    |                | F E M A L E |                        | T O T A L |                       |
|-----------|---------------------------------|--------------------|----------------|-------------|------------------------|-----------|-----------------------|
|           | Total<br>population<br>examined | Number<br>of cases | % male<br>Pop. | Number      | % Female<br>Population | Number    | % Total<br>population |
| 0-10      | 4,447                           | 7                  | 0.266          | 1           | 0.054                  | 8         | 0.179                 |
| 11-20     | 2,899                           | 3                  | 0.194          | 3           | 0.220                  | 6         | 0.206                 |
| 21-30     | 1,741                           | 5                  | 0.692          | 9           | 0.883                  | 14        | 0.804                 |
| 31-40     | 1,314                           | 15                 | 2.712          | 63          | 8.278                  | 78        | 5.936                 |
| 41-50     | 972                             | 98                 | 19.959         | 168         | 34.927                 | 266       | 27.366                |
| 51-60     | 686                             | 175                | 48.746         | 198         | 60.550                 | 373       | 54.373                |
| 61-70     | 448                             | 200                | 80.000         | 155         | 78.282                 | 355       | 79.241                |
| Over 70   | 236                             | 148                | 100.000        | 88          | 100.000                | 236       | 100.000               |
| Total     | 12,743                          | 651                | 9.735          | 685         | 11.311                 | 1336      | 10.484                |



in 1st decade, 0.72% in the 5th decade, 2.473% in 6th decade, 5.58% in the 7th decade & 9.322% over 7th decade. Thus, though cataract makes its appearance after 3rd decade aphakia makes its appearance in 5th decade.

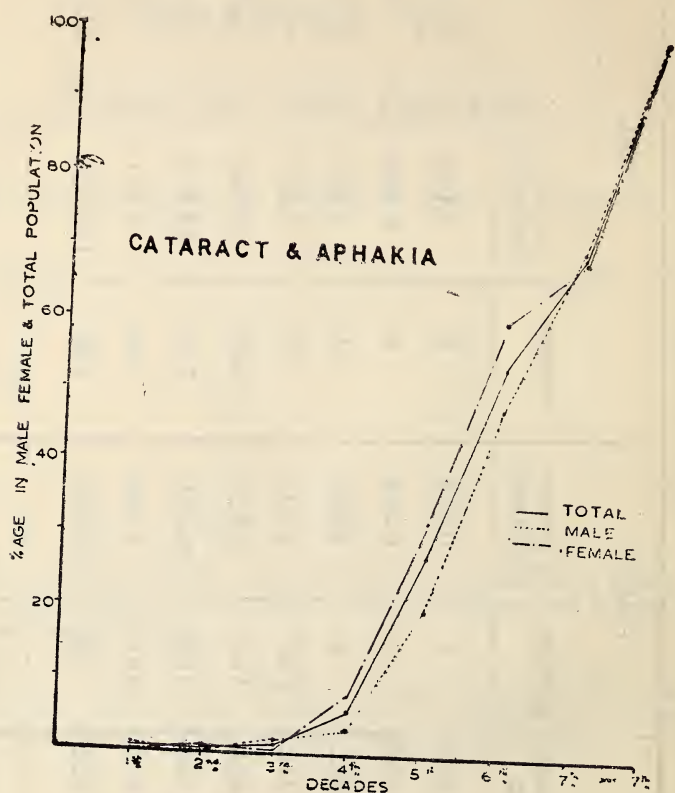


Fig. 13

Thus a general tendency for aphakia to follow cataract with a gap of one decade is striking (Table 33)

TOTAL CATARACT & APHAKIA  
KHARAR AND RAIPUR RANI[illegible]

Corresponding figures for cataract available with other workers age-group-wise are compared—

**Table 34**

|                                   | Ours    | Aggarwal<br>et al | Ours                              | Aggarwal<br>1967 | Franken et al<br>1968 |
|-----------------------------------|---------|-------------------|-----------------------------------|------------------|-----------------------|
| 0-10                              | 0.156%  | —                 | 0.179%                            |                  |                       |
| 11-20                             | 0.206%  | —                 | 0.206%                            |                  |                       |
| 21-30                             | 0.804%  | —                 | 0.804%                            |                  |                       |
| 31-40                             | 5.936%  | 2.91%             | 5.936%                            | 3.33%            | 2.599%                |
| 41-50                             | 26.646% | 16.6%             | 27.366%                           | 19.35%           | 9.030%                |
| 51-60                             | 51.895% | 34.8%             | 54.373%                           | 40.8%            | 22.488%               |
| 61-70                             | 73.660% | 54.3%             | 79.241%                           | 69.82%           | 31.421%               |
| Over 70                           | 90.677% | 61.5%             | 100%                              | 82.05%           |                       |
| Total                             | 9.919%  | 5%                | 10.484%                           | 6.08%            |                       |
| Cataracts<br>excluding<br>aphakia |         |                   | Cataracts<br>including<br>aphakia |                  |                       |

%age worked out by us from the figures available.

Our figures of general cataract are much higher than those reported from Delhi and Ludhiana. It is not the factor of general medical facilities because even if aphakia is included these figures are much higher as compared with figures of Franken. Our figures are almost twice as much in the 4th decade three times as much in the 5th decade, 2.5 times as much in 6th decade and 2.7 times as much after sixth decade. The incidence based on total population is 10.484% as compared to 4.229% reported by Franken et. al. and 6.08% derived from the figures of Aggarwal et. al. Chatterjee (1968) reported incidence of 5.37% in Lahaul and Sipiti a hilly region at a high altitude. Ghosh et al (1969) reported incidence of 6.2% near Pondicherry.

### Aphakia

The general incidence of cataract patients is 9.919% as compared to total 10.484%. The former incidence includes those aphakes who have cataract in the other eye, while the latter incidence includes even those aphakes who do not have cataract in the other eye. If we consider aphakia cases irrespective of the presence or absence of cataract in the other eye (Table 35), then aphakia is 1.45% in the general population. Out of the total cataract and aphakia patients 13.847% are aphakic as against 41.79% reported by Franken (1968). The general ratio of patients with mature cataract and aphakia is 1.162:1, i.e., for every one thousand patients operated there are 1162 more who need surgery.

Table 35

## A P H A K I A

| Age Group                               | Bilateral |        | Unilateral                            |                                         | Total   | Total Percentage Group Population         |
|-----------------------------------------|-----------|--------|---------------------------------------|-----------------------------------------|---------|-------------------------------------------|
|                                         | Male      | Female | Other Eye other than Cataract<br>Male | Other Eye other than Cataract<br>Female |         |                                           |
| 0 - 10                                  | —         | —      | 1                                     | —                                       | 1       | 0.022                                     |
| 11 - 20                                 | —         | —      | —                                     | —                                       | —       | —                                         |
| 21 - 30                                 | —         | —      | —                                     | —                                       | 1       | 0.057                                     |
| 31 - 40                                 | —         | —      | —                                     | —                                       | 4       | 0.380                                     |
| 41 - 50                                 | 2         | 3      | 2                                     | 1                                       | 25      | 2.572                                     |
| 51 - 60                                 | 7         | 5      | —                                     | 3                                       | 41      | 5.976                                     |
| 61 - 70                                 | 15        | 3      | 1                                     | 4                                       | 61      | 13.616                                    |
| Over 70                                 | 9         | —      | 3                                     | 7                                       | 51      | 21.610                                    |
| TOTAL                                   | 33        | 18     | 7                                     | 14                                      | 185     | Male : 96 (1.435%)<br>Female: 89 (1.469%) |
| Percentage in total population          | 51        |        | 134                                   |                                         | 1.451   | (p>0.05)                                  |
| %age out of total Aphakia cases         | 0.400%    |        | 0.51%                                 |                                         |         |                                           |
|                                         | 27.5%     |        | 72.5%                                 |                                         |         |                                           |
| Total Cataract Including Aphakia (1336) | 3817      |        | 10.029%                               |                                         | 13.847% |                                           |

Total Cataract &amp; Aphakia table 33



Amongst the aphakic patients 27.5% are bilateral aphakes and 72.5% are unilateral aphakes. 5/6th of these further need surgery in the other eye, in the rest 1/6th there is neither cataract nor aphakia in the second eye. The general incidence of aphakia in either sex is almost same, 1.435% in male population and 1.466% in the female population (statistically in --significant). The general impression that females are less exposed to medical treatment does not seem to be true.

The rising curve of aphakia prevalence in respective age group population is 0.022% in the first decade, 0.057% in third decade and then 0.380%, 2.572%, 5.975%, 13.616% and 21.610% in the 4th, 5th and 6th decades and over 7th decade, respectively).

### **Bilaterality & Unilaterality:**

As already pointed out, 27.5% of the aphakes have bilateral aphakia and in the rest 72.5% unilateral aphakia (in the total population the figures are 0.400% bilateral, and 1.051% unilateral.)

Only cataract cases have bilaterality in 81.2% and unilaterality in 18.8% (Table 33). In combined cataract and aphakia cases bilaterality is 79.9% while unilaterality is 20.1% (Table 36). Cases of mature cataract encountered are 16.4% bilateral and 83.6% unilateral.

This means that unilateral aphakes are more and so are patients with unilateral cataract. Bilateral aphakes are only 0.4% as against 8% bilateral cataracts excluding aphakia.

This confirms the belief that those cases who get one eye operated usually do not bother about the other eye till late or may be till it is too late.

### **Immaturity & Maturity:**

The percentage of immature cataracts in the total population is 8.875% (Table 37). The general pattern in various age groups being the same, as in the combined series of cataract and aphakia, it is bilateral in 79.48% and unilateral in 20.51%.

Maturity on the other hand is 0.089% in the first decade, 0.068% in the second decade, 0.114%, 0.380%, 3.703%, 6.268%, 16.517% and 20.762% in the third, fourth fifth, sixth, seventh decade, and over 7th decade respectively (Table 38). Out of total 1.687% mature cataract, 0.274% are bilateral and 1.412% unilateral. Unilateral as well as bilateral cataract are more in females-(Males 0.224% bilateral and 1.241% unilateral. Females 0.330% bilateral and 1.601% unilateral).

The bilaterality of mature cataract cases is 16.% in contrast to the bilaterality of immature cataracts (79.48%) and of aphakia (3.817%). This shows the general lack of immediate medical facilities. People generally depend upon the Eye-Camps for surgery, and so they wait for a year or more for a particular camp to be set up. Apart from this other

Table 36

## TOTAL CATARACT CASES INCLUDING APHAKIA

| Age Group                | Bilateral Cataract/Aphakia |        |       | Unilateral Cataract/Aphakia |      |        |
|--------------------------|----------------------------|--------|-------|-----------------------------|------|--------|
|                          | Male                       | Female | Total | Percentage                  | Male | Female |
| 0—10                     | 4                          | .....  | 4     | 0.089                       | 3    | 1      |
| 11—20                    | .....                      | 1      | 1     | 0.034                       | 3    | 2      |
| 21—30                    | 3                          | 6      | 9     | 0.516                       | 2    | 3      |
| 31—40                    | 10                         | 51     | 61    | 4.642                       | 5    | 12     |
| 41—50                    | 74                         | 141    | 215   | 22.119                      | 24   | 27     |
| 51—60                    | 154                        | 165    | 319   | 46.500                      | 21   | 33     |
| 61—70                    | 156                        | 121    | 277   | 61.830                      | 44   | 34     |
| Over 70                  | 126                        | 51     | 181   | 76.69                       | 22   | 33     |
| Total                    | 527                        | 540    | 1,067 | 8.373                       | 124  | 145    |
| % age out of total cases |                            |        | 79.90 | 20.10%                      |      |        |
| Percentage               |                            |        | 7.88% | 8.91%                       | 1.85 | 2.39   |

contributory factors towards the general callousness are :—

- (a) The rural people, by and large being agriculturists and being self workers, they do not get much time out of their work.
- (b) There is a general lack of concern for the older folks.
- (c) A villager who has never come to a city is usually afraid of the hustle and bustle and feels lost in the city crowd, and does not dare to come for help in the city hospital where most of the facilities are concentrated.
- (d) Hospitals, being less in number and crowded, the time and energy required for a patient and his attendant is so much, that after first visit most of them do not dare a second trial.

**Table XXXVII**  
**IMMATURE CATARACT**

| Age Group                | Bilateral |        | Unilateral |        | Total | %age<br>in group<br>population |
|--------------------------|-----------|--------|------------|--------|-------|--------------------------------|
|                          | Male      | Female | Male       | Female |       |                                |
| 0—10                     | 3         | ...    | ...        | ...    | 3     | 0.067                          |
| 11—20                    | ...       | 1      | 2          | 1      | 4     | 0.137                          |
| 21—30                    | 2         | 6      | 1          | 3      | 12    | 0.689                          |
| 31—40                    | 10        | 51     | 3          | 9      | 73    | 5.550                          |
| 41—50                    | 66        | 124    | 20         | 27     | 237   | 24.382                         |
| 51—60                    | 140       | 142    | 16         | 34     | 332   | 48.396                         |
| 61—70                    | 122       | 89     | 40         | 41     | 292   | 65.178                         |
| Over 70                  | 103       | 40     | 18         | 17     | 178   | 75.423                         |
| Total                    | 446       | 453    | 100        | 132    | 1,131 |                                |
|                          | 899       |        | 232        |        | 1,131 |                                |
| % in Total<br>Population | 7.504     |        | 1.820      |        | 8.876 |                                |
| Group%                   | 79.48     |        | 20.51      |        |       |                                |

Over and above this, lack of hard cash used to be the pressing factor, but with the Green Revolution that is setting in, this problem is taken care of. With the general awareness on the increase, the attitude of the people is also changing.



Table 38

## MATURE CATARACT

| Age Group | Total Cataract cases | Bilateral cataract |        | Unilateral cataract |        | Total | Percentage total group population | Percentage in Cataract Population |
|-----------|----------------------|--------------------|--------|---------------------|--------|-------|-----------------------------------|-----------------------------------|
|           |                      | Male               | Female | Male                | Female |       |                                   |                                   |
| 0-10      | 7                    | 1                  | —      | 2                   | 1      | 4     | 0.089                             | 57.142                            |
| 11-20     | 6                    | —                  | —      | 1                   | 1      | 2     | 0.668                             | 33.833                            |
| 21-30     | 14                   | 1                  | —      | 1                   | —      | 2     | 0.114                             | 14.285                            |
| 31-40     | 78                   | —                  | —      | 2                   | 3      | 5     | 0.380                             | 6.410                             |
| 41-50     | 259                  | 1                  | 5      | 12                  | 18     | 36    | 3.703                             | 13.899                            |
| 51-60     | 356                  | 2                  | 2      | 15                  | 24     | 43    | 6.268                             | 12.078                            |
| 61-70     | 330                  | 4                  | 6      | 33                  | 31     | 74    | 16.517                            | 22.424                            |
| Over 70   | 214                  | 6                  | 7      | 17                  | 19     | 49    | 20.762                            | 22.897                            |
| Total     | 1,264                | 15                 | 20     | 83                  | 97     | 215   |                                   | 17.009                            |

Percentage in sex

population : 0.224 0.330 1.241 1.601

Percentage of

total Population 0.274 1.412 1.687

Percentage out of

mature cataract cases 16.4 63.6 100



**Sex:**

In general the incidence of cataract and aphakia is more in the females (11.311%) as against males (9.735%). Statistically the difference is highly significant ( $p < .01$ ). In the 4th, 5th and 6th decades, in general, the incidence in females is much higher (8.278% as against 2.712% in the males). In the 4th decade, (34.927% as against 19.959% in the males), in the 5th decade, (60.550% as against 48.746% in the males); in the 6th decade and beyond 6th decade, it is almost same in either sex. This difference is not dependant upon the aphakia, because aphakia is almost equal in either sex.

**Aetiology:** (Table : 39)

Aetiologically the largest contribution to cataract formation in general population is that of senile cataract (98.1%), as against 0.7% traumatic cataract, 0.6% congenital cataract and 0.6% complicated cataract. Even before 40 years 6.8% of the senile cataract cases are labelled 'senile'. The senile type of cataract case is taken as a clinical entity and not as an age-dependant process. These type of changes start so early here in this part of the world that it some times appears to be a misnomer to label a particular case as senile cataract.

Table 39

## TYPE OF CATARACT

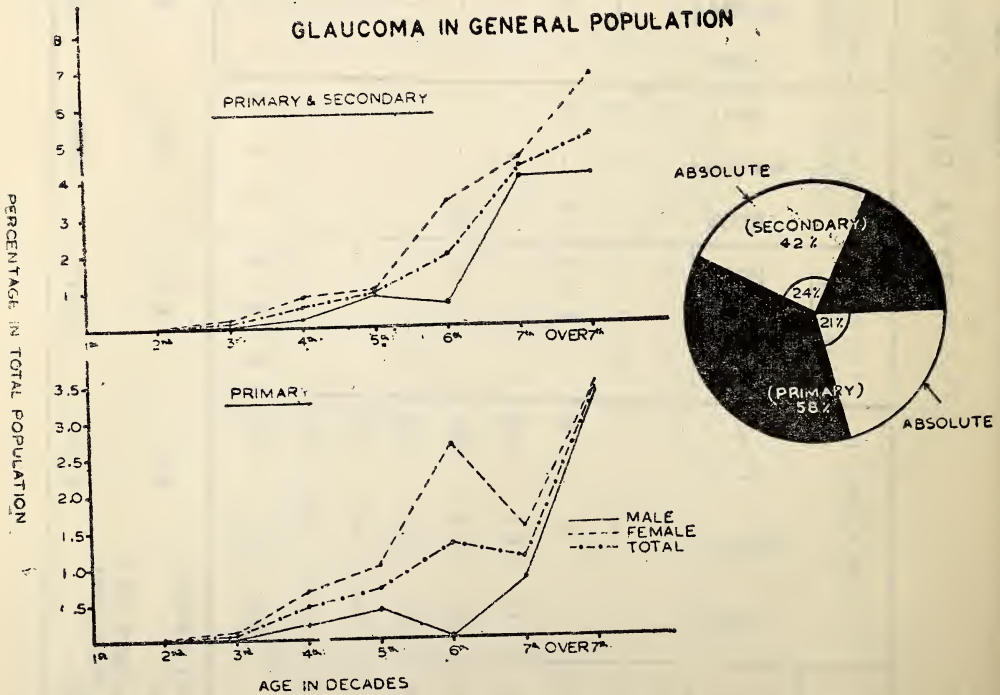
| Age Group                          | Senile Cataract |        |       | Traumatic Cataract |        |       | Congenital Cataract |        |       | Complicated Cataract |        |       | Total |        | Group Percentage |
|------------------------------------|-----------------|--------|-------|--------------------|--------|-------|---------------------|--------|-------|----------------------|--------|-------|-------|--------|------------------|
|                                    | Male            | Female | Total | Male               | Female | Total | Male                | Female | Total | Male                 | Female | Total | Male  | Female |                  |
| 0-10                               | —               | —      | —     | 1                  | 1      | 2     | 4                   | —      | 4     | 1                    | —      | 1     | 6     | 1      | 0.156            |
| 11-20                              | —               | —      | —     | 3                  | 2      | 5     | —                   | 1      | 1     | —                    | —      | —     | 3     | 3      | 0.206            |
| 21-30                              | —               | 6      | 6     | 1                  | 1      | 2     | 3                   | —      | 3     | 1                    | 2      | 3     | 5     | 9      | 0.804            |
| 1-40                               | 15              | 63     | 78    | —                  | —      | —     | —                   | —      | —     | —                    | —      | —     | 15    | 63     | 5.936            |
| 41-50                              | 94              | 165    | 259   | —                  | —      | —     | —                   | —      | —     | —                    | —      | —     | 94    | 165    | 26.645           |
| 51-60                              | 167             | 187    | 354   | —                  | —      | —     | —                   | —      | —     | 1                    | 1      | 2     | 168   | 188    | 51.895           |
| 61-70                              | 184             | 146    | 330   | —                  | —      | —     | —                   | —      | —     | —                    | —      | —     | 184   | 146    | 73.660           |
| Over 70                            | 135             | 78     | 213   | —                  | —      | —     | —                   | —      | —     | 1                    | —      | 1     | 136   | 78     | 90.677           |
| Total                              | 595             | 645    | 1240  | 5                  | 4      | 9     | 7                   | 1      | 8     | 4                    | 3      | 7     | 611   | 653    | 9.919            |
|                                    |                 |        |       |                    |        |       |                     |        |       | 9.13%                | 10.78% |       |       |        |                  |
| Out of Cataract Cases :            |                 |        | 98.1% | 0.7%               |        |       | 0.6%                |        |       | 0.6%                 |        |       |       |        |                  |
| Percentage out of Total Population |                 |        | 9.73% | 0.07%              |        |       | 0.06%               |        |       | 0.06%                |        |       |       |        |                  |
| 12,743                             |                 |        |       |                    |        |       |                     |        |       |                      |        |       |       |        |                  |

# CHAPTER IX

## Glaucoma

**Prevalence :** (Table : 40 ; Fig. 14)

The general prevalence of glaucoma as detected in this survey is 0.486% in general population. Over 30 years of age it is 1.641%, over 40 years 2.264% and over 60 years 4.532%. The primary glaucoma is 0.282% in general population, the rest being secondary in nature. The prevalence of glaucoma over the age of 40 has been reported to be less than 1.0%



**Fig 14**

Table 40

TOTAL GLAUCOMA CASES  
(PRIMARY & SECONDARY INCLUSIVE)

| Age Group | Early |     | Absolute |     | Total |     | Total | Group % | % out of glaucoma cases |
|-----------|-------|-----|----------|-----|-------|-----|-------|---------|-------------------------|
|           | M     | F   | M        | F   | M     | F   |       |         |                         |
| 0-10      | ...   | ... | ...      | ... | ...   | ... | ...   | ...     | ...                     |
| 11-20     | ...   | ... | ...      | ... | ...   | ... | ...   | ...     | ...                     |
| 21-30     | ...   | 1   | ...      | 1   | ...   | 2   | 2     | 0.11    | 3.22                    |
| 31-40     | 1     | 3   | ...      | 3   | 1     | 6   | 7     | 0.53    | 11.29                   |
| 41-50     | 3     | 3   | 1        | 2   | 4     | 5   | 9     | 0.92    | 14.51                   |
| 51-60     | 1     | 8   | 1        | 3   | 2     | 11  | 13    | 1.89    | 20.96                   |
| 61-70     | 4     | 3   | 6        | 6   | 10    | 9   | 19    | 4.24    | 30.64                   |
| Over 70   | 3     | 4   | 3        | 2   | 6     | 6   | 12    | 5.08    | 19.35                   |
| Total     | 12    | 22  | 11       | 17  | 23    | 39  | 62    | .486    |                         |

0.344% 0.644%

% in male & female  
Grand Total 34 28  
% 55% 45%

(p &lt; .05)



(Posner 1964), to as high as 3% (Lasky 1959). Numerical comparison of various figures is meaningless, because of the multiple variables. In the same community Neumann (1965) found that in a hut-to-hut survey, glaucoma was 4.43%, in vaccination campaign 3.08%, in City Streets it came out 2.48%, and in Town Hall Assemblage it was 4.09%. The particular method adopted in this survey has been outlined earlier. Only established glaucoma cases having high tension and disc changes have been included in this study. The general incidence as reported by various other workers is tabulated :

**Table 41**

|                      |                             |                                     |                |
|----------------------|-----------------------------|-------------------------------------|----------------|
| Neumann (1965)       | Liberia                     | 3.25% (over 40 years)               |                |
| Packer (1959)        |                             | 6.9% (over 40 years<br>(Eye clinic) |                |
| Over 40,             |                             | 1.2% (Non Hospital Group)           |                |
| Under 40,            |                             | 0.2% " " "                          |                |
| Over 40,             |                             | 2% (Caucassian)                     |                |
|                      |                             | 5.2% (negro)                        |                |
| Leydhecker (1961)    |                             | 1.47%                               |                |
|                      |                             | 2.31% after 40                      |                |
| Blumenthal (1965)    | Israel                      | (1.73% above 40)                    |                |
| Holmes (1961)        | Central & South<br>Pacific. | 1.15%                               |                |
|                      | India                       |                                     |                |
| Sarda (1961)         |                             | 1.25% over 35 (general population)  |                |
|                      |                             | 4.50% (Eye Clinic)                  |                |
| Daniel (1967)        |                             | 4.5% over 35. (Eye Clinic)          |                |
| Franken (1968)       |                             | 1.185% total                        |                |
|                      |                             | 3.364% over 30                      |                |
| <b>Our figures :</b> | <b>Total</b>                | <b>males</b>                        | <b>female.</b> |
| General Pouplation   | 0.486%                      | 0.344%                              | 0.644%         |
| Over 30              | 1.641%                      | 1.277%                              | 1.994%         |
| Over 40              | 2.264%                      | 1.762%                              | 2.833%         |
| Over 60              | 4.532%                      | 4.020%                              | 5.244%         |

### Prevalence by age:

Sarda (1961) takes age base line for simple glaucoma as 35 years. Franken (1968) has taken it as 30 years. He encountered glaucoma both primary and secondary in 21-30 years of age group. The primary was 0.057%, and so was secondary, the total being 0.11%. This prevalence rate was of established glaucoma cases. Routine tonometry was not done in this survey and only when it was felt necessary it was resorted to. Thus we agree with Leydhecker (1961), who on routine tonometry of 10,000 persons, found simple glaucoma in 0.43% in the 20-29 year age group, and pointed out that glaucoma should be looked for before 30 years also.

In the third decade the incidence encountered by us is 0.11%, in the fourth decade 0.53% and 0.92%, 1.89%, 4.24%, 5.03% for the 5th, 6th, 7th decade and beyond it. The prevalence of primary glaucoma is 0.057% in the third decade, 0.456% in 4th decade, 0.72% in fifth decade, 1.311% in 6th decade, 1.116% in 7th decade and 3.389% beyond 7th decade (Table 42)

### Prevalence by sex:

The general incidence is 0.344% in the male population and 0.644% in the female population. The difference is statistically significant. ( $p < 0.05$ ). Over 30 years it is 1.277% for the male and 1.994% for females. Over 40 years it is 1.762% for males and 2.833% for females. Over 60 years it is 4.02% for males and 5.244% for females.

Primary glaucoma is encountered in males in 0.18% in the 4th decade, 0.407% in the 5th decade, 0.80% in the 7th decade and 3.378% over 7th decade. For females the figures are 0.098%, 0.657%, 1.039%, 2.752%, 1.515%, 3.409% in the 3rd, 4th, 5th, 6th, 7th decade and beyond 7th decade. In general in the male population this is 0.149% and in the female population 0.429%. The difference is statistically significant ( $p < 0.05$ ). (Table 43)

### Glaucoma by stage :

In primary glaucoma 36.1% have become "absolute", while in the total glaucoma cases 45% are 'absolute'. In this 45%, 21% are of primary glaucoma and 24% of secondary glaucoma. (Table : 44)

Table 42

## PRIMARY GLAUCOMA

| Age group | Early stages |     | Absolute stages |     | Total       |             | Total       |
|-----------|--------------|-----|-----------------|-----|-------------|-------------|-------------|
|           | M            | F   | M               | F   | M           | F           |             |
| 0-10      | ...          | ... | ...             | ... | ...         | ...         | ...         |
| 11-20     | ...          | ... | ...             | ... | ...         | ...         | ...         |
| 21-30     | ...          | 1   | ...             | ... | ...         | 1           | 1<br>.057%  |
| 31-40     | 1            | 3   | ...             | 2   | 1<br>0.180% | 3<br>.657%  | 6<br>.456%  |
| 41-50     | 1            | 3   | 1               | 2   | 2<br>0.407% | 5<br>1.039% | 7<br>.721%  |
| 51-60     | ...          | 6   | ...             | 3   | ...         | 9<br>2.752% | 9<br>1.311% |
| 61-70     | 2            | 2   | ...             | 1   | 2<br>0.8%   | 3<br>1.515% | 5<br>1.116% |
| Over 70   | 2            | 2   | 3               | 1   | 5<br>3.378% | 3<br>3.409% | 8<br>3.389% |
| Total     | 6            | 17  | 4               | 9   | 10          | 26          | 36          |
|           | 23           |     | 13              |     |             |             |             |
|           | 63.9%        |     | 36.1%           |     | 0.149%      |             | 0.282%      |
|           | 0.180%       |     | 0.102%          |     |             |             |             |

The difference of male:female is significant  $p < .05$

Table 43

## PRIMARY GLAUCOMA

| Age Group | Male | % age out of males | Female | % age out of Females |
|-----------|------|--------------------|--------|----------------------|
| 0-10      | ...  | ...                | ...    | ...                  |
| 11-20     | ...  | ...                | ...    | ...                  |
| 21-30     | ...  | ...                | 1      | .098                 |
| 31-40     | 1    | .18                | 5      | .657                 |
| 41-50     | 2    | .407               | 5      | 1.039                |
| 51-60     | ...  | ...                | 9      | 2.752                |
| 61-70     | 2    | .8                 | 3      | 1.515                |
| Over 70   | 5    | 3.378              | 3      | 3.409                |
| Total     | 10   | .149               | 26     | .429                 |

The difference is significant (  $p < .05$  )



Table 44  
**G L A U C O M A**

| Absolute  |    |     | Early |     | Total |     |
|-----------|----|-----|-------|-----|-------|-----|
| Primary   | 13 | 21% | 23    | 37% | 36    | 58% |
| Secondary | 15 | 24% | 11    | 18% | 26    | 42% |
| Total     | 28 | 45% | 34    | 55% | 62    | ... |

**Visual Status : (Table : 45)**

70.967% of the glaucoma cases are economic blind, (more than  $1\frac{1}{2}$  times are stone blind, while the rest have some vision left). In 4.838% vision in both eyes is almost equal ( $\frac{1}{3}$  having sub-normal vision while  $\frac{2}{3}$  have good vision). In 8% one eye is less than 6/60 while the other has sub-normal vision. In 16.1% one eye is better than 6/18, the other being sub-normal or blind (the former being  $1\frac{1}{2}$  times more as compared to the latter).

Table 45

VISUAL STATUS — GLAUCOMA PATIENTS — BOTH BLOCKS

| Age Group | One Eye upto 6/18   |   |                        |   | One Eye 6/24-6/36 other Eye 6/60 or less |   |   |   | Both Eyes better than 6/18 |   |   |   | Both Eyes upto 6/24-6/36 |   |   |   | Both Eyes upto 6/60 or less |    |    |    | Both Eyes PL — PR |    |    |    | Total | Grand Total |   |  |    |  |    |  |    |  |
|-----------|---------------------|---|------------------------|---|------------------------------------------|---|---|---|----------------------------|---|---|---|--------------------------|---|---|---|-----------------------------|----|----|----|-------------------|----|----|----|-------|-------------|---|--|----|--|----|--|----|--|
|           | Other Eye 6/24-6/38 |   | Other Eye 6/60 or less |   | M                                        | F | M | F | M                          | F | M | F | M                        | F | M | F | M                           | F  | M  | F  |                   |    |    |    |       |             |   |  |    |  |    |  |    |  |
|           | M                   | F | M                      | F |                                          |   |   |   |                            |   |   |   |                          |   |   |   |                             |    |    |    |                   |    |    |    |       |             |   |  |    |  |    |  |    |  |
|           |                     |   |                        |   |                                          |   |   |   |                            |   |   |   |                          |   |   |   |                             |    |    |    |                   |    |    |    |       |             |   |  |    |  |    |  |    |  |
| 0-10      | —                   | — | —                      | — | —                                        | — | — | — | —                          | — | — | — | —                        | — | — | — | —                           | —  | —  | —  | —                 | —  | —  |    |       |             |   |  |    |  |    |  |    |  |
| 11-20     | —                   | — | —                      | — | —                                        | — | — | — | —                          | — | — | — | —                        | — | — | — | —                           | —  | —  | —  | —                 | —  | —  | —  |       |             |   |  |    |  |    |  |    |  |
| 21-30     | —                   | 1 | —                      | — | —                                        | — | — | — | —                          | — | — | — | —                        | — | — | — | —                           | —  | —  | —  | 1                 | —  | 2  | 2  |       |             |   |  |    |  |    |  |    |  |
| 31-40     | —                   | 1 | —                      | 1 | —                                        | — | — | — | 1                          | — | — | — | —                        | — | — | — | —                           | —  | —  | —  | —                 | 3  | 1  | 6  | 7     |             |   |  |    |  |    |  |    |  |
| 41-50     | —                   | 2 | 1                      | — | —                                        | 1 | — | — | —                          | — | — | — | —                        | — | — | — | 2                           | —  | —  | —  | 1                 | 2  | 4  | 5  | 9     |             |   |  |    |  |    |  |    |  |
| 51-60     | —                   | 1 | —                      | — | —                                        | 1 | — | — | —                          | 1 | — | — | —                        | — | — | — | 1                           | 5  | —  | —  | 1                 | 3  | 2  | 11 | 13    |             |   |  |    |  |    |  |    |  |
| 61-70     | 1                   | — | 1                      | 1 | 1                                        | 1 | — | — | —                          | — | — | — | —                        | — | — | — | 1                           | 1  | —  | —  | 6                 | 6  | 10 | 9  | 19    |             |   |  |    |  |    |  |    |  |
| Over 70   | —                   | — | —                      | — | —                                        | 1 | — | — | —                          | — | — | — | 1                        | — | — | — | 3                           | 3  | —  | —  | 2                 | 2  | 6  | 6  | 12    |             |   |  |    |  |    |  |    |  |
| Total     | 1                   | 5 | 2                      | 2 | 1                                        | 4 | 2 | 2 | 1                          | 1 | 1 | 1 | 1                        | — | 1 | — | 7                           | 10 | 10 | 17 | 23                | 39 | 62 | 62 |       |             |   |  |    |  |    |  |    |  |
|           |                     |   |                        |   |                                          |   |   |   |                            |   |   |   |                          |   |   |   |                             |    |    |    |                   |    | 5  |    | 2     |             | 1 |  | 17 |  | 27 |  | 62 |  |

% out of Total Glaucoma

16.129%

8.062%

4.8381%

70.967

## Chapter X

### Pterygium<sup>in</sup>

Pterygium has been known to the scientific world since the times of Susrata (1000 B. C.) but still the aetiology of such an obvious disease has eluded the ophthalmic world. It was for this reason that the need for the study of its geographic distribution arose. The four separate monographs on this topic that appeared from 1892 to 1965 underline the same problem of its intriguing nature (Fuchs 1892, Conrie 1933, Hilger 1960, Cameron 1965).

Work by Parathasarthy (1967) and Franken (1968) has lately appeared on this topic in India.

#### Prevalence percentages :

The percentages of general prevalence as reported by various workers are as follows:—

|                                |   |        |
|--------------------------------|---|--------|
| Parathasarthy and Gupta (1967) | — | 1.23%  |
| Franken (1968)                 | — | 1.498% |
| Ours                           | — | 2.864% |

Cameron has provided data in general, basing observations on the number of pterygium operations done as a percentage of major ocular operations. His figures are as follows:—

|           | Pterygium   | Latitude    |
|-----------|-------------|-------------|
| Low       | 0-1.9%      | 40° or more |
| Moderate  | 2-4.9%      | 35°-40°     |
| High      | 5-10%       | 30°-35°     |
| Very high | 10% or more | 30°-Equator |

The area under survey is between 30°-31° latitude but the incidence is moderate according to Cameron's data. The variation in the figures is because of the technique of data collection. It is for the same reason that figures given by Franken-et-al also vary from those given by Cameron. These figures fall in the low prevalence group.

**Table 46**  
**P T E R Y G I U M**

| Age Group               | Group Population | Unilateral |        |       | Bilateral  |        |        | Grand Total |            |        | %age  |        |       |       |        |
|-------------------------|------------------|------------|--------|-------|------------|--------|--------|-------------|------------|--------|-------|--------|-------|-------|--------|
|                         |                  | Male       | Female | Total | Percentage | Male   | Female | Total       | Percentage | Male   |       | Female | Total |       |        |
| 0-10                    | 4,447            | 1          | 1      | 2     | 0.045      | —      | —      | —           | 1          | 0.03   | 1     | 0.05   | (2)   | 0.045 |        |
| 11-20                   | 2,899            | 3          | 4      | 7     | 0.241      | 3      | 3      | 6           | 0.207      | 6      | 0.38  | 7      | 0.51  | (13)  | 0.448  |
| 21-30                   | 1,741            | 17         | 5      | 22    | 1.263      | 13     | 3      | 16          | 0.919      | 30     | 4.15  | 8      | 0.78  | (38)  | 2.182  |
| 31-40                   | 1,814            | 30         | 14     | 44    | 3.348      | 26     | 8      | 34          | 2.587      | 56     | 10.12 | 22     | 2.89  | (78)  | 5.936  |
| 41-50                   | 972              | 30         | 13     | 43    | 4.424      | 36     | 8      | 44          | 4.526      | 66     | 13.44 | 21     | 4.36  | (87)  | 8.950  |
| 51-60                   | 686              | 29         | 3      | 32    | 4.664      | 35     | 9      | 44          | 6.413      | 64     | 17.82 | 12     | 3.66  | (76)  | 11.078 |
| 61-70                   | 448              | 6          | 3      | 9     | 2.008      | 29     | 7      | 36          | 8.035      | 35     | 14.00 | 10     | 5.05  | (45)  | 10.044 |
| above 70                | 236              | 6          | 3      | 9     | 3.813      | 16     | 1      | 17          | 7.203      | 22     | 14.86 | 4      | 4.54  | (26)  | 11.016 |
| Total                   |                  | 122        | 46     | 168   |            | 158    | 39     | 197         |            | 280    |       | 85     |       | 365   |        |
| Percentage out of 12743 |                  | 1.318%     |        |       |            | 1.545% |        |             |            |        |       |        |       |       | 2.864% |
| Out of total 365        |                  | 46.027     |        |       |            | 53.973 |        |             |            |        |       |        |       |       |        |
| Percentage Out of 6687  |                  |            |        |       |            |        |        |             |            |        |       |        |       |       |        |
| Males                   |                  | 1.824%     |        |       |            | 2.362% |        |             |            | 4.187% |       |        |       |       |        |
| Out of Females          |                  | 0.759      |        |       |            | 0.643  |        |             |            | 1.403  |       |        |       |       |        |
| 6056                    |                  |            |        |       |            |        |        |             |            |        |       |        |       |       |        |

M.V.F.  $p < .01$



## Unilateral, Bilateral Tendency : (Table 46)

46.027% are unilateral and 53.973% are bilateral. This is in contrast to the figures of Franken (70.54% unilateral and 29.46% bilateral). The ratio as found by Zaubermann in Israel (1967) was 79:21 as against our 46:54.

### Sex distribution :

In the males the prevalence is 4.187% as against 1.403% in the females. This higher prevalence in male is statistically significant ( $p < .01$ ). It is unilateral in males in 1.824% and bilateral in 2.362%. The corresponding figures for the female population are 0.759% and 0.643%.

The percentage involvement in males as reported by Franken is 1.781%, in males and 1.192% in females.

The sex and age-wise data is compared with that of Franken-et-al (1968) in table 47.

**Table 47**

|         | Franken 1968 |         | Total% | Male% | Ours    |        |
|---------|--------------|---------|--------|-------|---------|--------|
|         | Male%        | Female% |        |       | Female% | Total% |
| 0-10    | —            | —       | —      | .03   | .05     | .56    |
| 11-20   | —            | —       | —      | .38   | .51     | .448   |
| 21-30   | .47          | .21     | .35    | 4.15  | .78     | 2.182  |
| 31-40   | 1.64         | .96     | 1.32   | 10.12 | 2.89    | 5.936  |
| 41-50   | 3.99         | 2.91    | 3.51   | 13.44 | 4.36    | 8.950  |
| 51-60   | 8.29         | 6.55    | 7.52   | 17.82 | 3.66    | 11.078 |
| Over 60 | 9.78         | 9.11    | 9.50   | 14.32 | 4.89    | 10.38  |
|         | 1.718        | 1.192   | 1.498  | 4.187 | 1.403   | 2.864  |

Thus we notice a general tendency for this to rise upto 6th decade and a fall later (fig 15). The rise in males from 2nd to 3rd decade is significant ( $p < .01$ ), while in the females the corresponding rise is not significant ( $p > .05$ ). Upto sixth decade the rise is progressive in males and upto 5th decade in the females. Curiously enough this rise and fall corresponds with the general sexual activity. In total group it is again significant. From 6th decade onwards, though the figures show a fall but further splitting in two decades, as shown in the table, does not show any significant difference ( $p > .05$ ).

## Age distribution

The general prevalence in various decades is 0.045%, 0.448%, 2.182%, 5.936%, 8.950%, 11.078%, 10.044% and 11.016% in 1st, 2nd, 3rd, 4th, 5th, 6th, 7th decade and over 7th decade. There is thus a progressive rise upto 6th decade. After this it is almost same, if at all there is a slight fall. Both the curves for unilaterality and bilaterality follow each other. The difference being that rise in bilaterality follows a decade later. Beyond 6th decade unilaterality shows a fall while bilaterality continues rising. This is mostly at the cost of males.

Franken et al (1968) do not report its occurrence before 3rd decade, while we found its prevalence as 0.2% before that decade.

## Pterygium and Impairment of vision

Parthasarathy (1967) reported visual impairment in 0.032% of the total and mentioned that in 2848 cases of Pterygium, no economic blindness was encountered. Franken et al (1968) found positive evidence of economic blindness because of pterygium. We have not come across any economic blindness but unilateral blindness was discovered in 22 cases out of 12743 cases and in 365 Pterygium cases. That underlines the greater surgical need, though it is not a huge blindness problem as such.

### PTERYGIUM

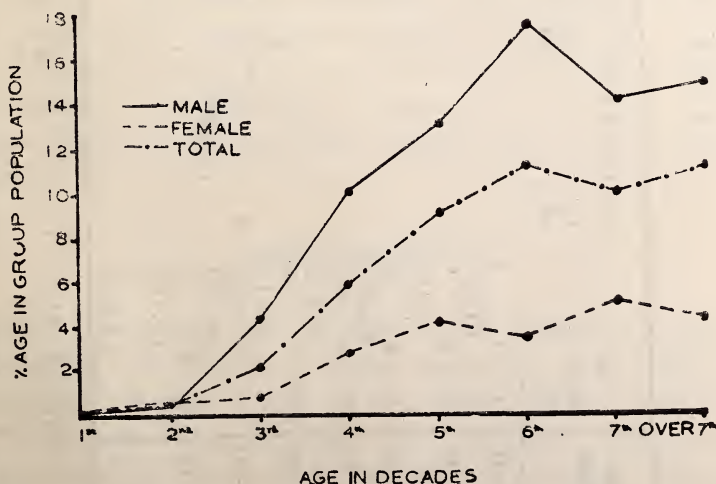


Fig. 15

Table 48

## PTERYGIUM

(Raipur Rani &amp; Kharar Block)

| Age Group | Unilateral |    |               |      |         |      | Nasal |   |             | Bilateral |       |        |       | Vision 6/60 or Less |       |
|-----------|------------|----|---------------|------|---------|------|-------|---|-------------|-----------|-------|--------|-------|---------------------|-------|
|           | Nasal      |    | %             | Temp | %       | Both | M     | F | % Total     | M         | F     | % Both | M     | F                   | %     |
|           | M          | F  | M             | F    | M       | F    |       |   |             |           |       |        |       |                     |       |
| 0-10      | 1          | 1  | 2<br>(0.045)  | —    | —       | —    | —     | — | —           | —         | —     | —      | —     | —                   | —     |
| 11-20     | 3          | 4  | 7<br>(.241)   | —    | —       | —    | 3     | 3 | 6<br>0.207  | —         | —     | —      | —     | —                   | —     |
| 21-30     | 14         | 5  | 19<br>(1.091) | 3    | —       | 3    | 11    | 3 | 14<br>0.804 | —         | —     | —      | —     | —                   | —     |
| 31-40     | 30         | 14 | 44<br>(3.348) | —    | (0.172) | —    | 22    | 7 | 29<br>2.207 | 1         | —     | 2      | —     | —                   | —     |
| 41-50     | 27         | 12 | 39<br>(4.012) | 3    | 1       | 4    | 30    | 7 | 37<br>3.806 | 2         | —     | 3      | 1     | —                   | —     |
| 51-60     | 27         | 3  | 30<br>(4.373) | 1    | (0.411) | —    | 29    | 8 | 37<br>5.393 | —         | —     | 4      | 1     | —                   | —     |
| 61-70     | 5          | 3  | 8<br>(1.785)  | —    | (0.145) | 1    | 19    | 4 | 23<br>5.133 | 3         | 1     | 7      | 2     | 2                   | 2     |
| Over 70   | 6          | 3  | 9<br>(3.813)  | —    | (0.223) | —    | 10    | 1 | 11<br>4.661 | 1         | —     | 5      | —     | 7                   | 3     |
|           |            |    |               |      |         |      |       |   |             |           | 0.892 | 2.008  | 2.118 | 0.423               | 4.237 |

113 45 158 1 — 1 8 1 9 124 33 157 7 1 8 27 5 32 16 6 22

Nasal — 86.3% 315 Temporal — 2.5% 9 Combined — 11.2% Total — 365

**Site** (Table 48 ; Fig. 15)

Amongst pterygium cases, it is nasal in 86.3% temporal in 2.5% and combined 'nasal and temporal' in 11.2%.

The general tendency for nasal occurrence is similar in all the decades, occurrence being maximum in 6th decade. The combined (nasal and temporal) series show an erratic rise in unilateral cases, while a progressive rise from 3rd decade onwards is noted in bilateral series

### **Aetiological considerations**

Cameron (1965) has summarised the prevalent theories. The general headings being infection, chronic irritation, pinguecula, radiation, dietary deficiency and other miscellaneous factors for example conjunctival venous thrombosis, blood stasis, and diminished tear secretion.

The chronic irritation because of dust and wind and radiational concepts have drawn more attention. In this part of the country Franken-et-al have studied the problem in the dry belt of the region, but apart from general statement no conclusions have been drawn. The region in which the study was undertaken, though more dusty and dry, but our percentage figures are definitely higher than those reported from that region (1.498% vs. 2.864%). We do attribute the view of general irritation, but that is not sufficient to explain the whole picture. It certainly cannot explain its presence in the first two decades. Generally the exposure is maximum in 3rd, 4th decades when more field work is being done but the prevalence is maximum after 6th decade. That might be indicative of some such pathological process that continues to follow its course once the trouble starts.

### **PINGUECULA**

The general incidence of this degenerative disorder is 0.187%. It is maximum in the 5th decade. In male population it is 0.254%. and in female population 0.099%. The general pattern is quite different from Pterygium and hence does not support the (Pinguecula—Pterygium) theory for the production of pterygium. Pathological similarity should not be taken as an index of similar pathogenesis. At least there is no clinical support to such a contention,



**Table 49**

| Age Group. | Male | Female | Total | Percentage |
|------------|------|--------|-------|------------|
| 0—10       | —    | —      | —     | —          |
| 11—20      | 4    | —      | 4     | 0.13       |
| 21—30      | 2    | —      | 2     | 0.11       |
| 31—40      | 6    | 1      | 7     | 0.53       |
| 41—50      | 3    | 4      | 7     | 0.72       |
| 51—60      | 1    | 1      | 2     | 0.29       |
| 61—70      | 1    | —      | 1     | 0.22       |
| Over 70    | —    | —      | —     | —          |
|            | 17   | 6      | 23    | 0.18       |

Group Percentage—Males 0.254% Females 0.029% Male Vs. Female  
 $p < 0.05$ .

# CHAPTER XI

## Squint

Examination of the visual axes was done by Hirschberg and Cover test. These tests were carried out to find out the degree and type of tropias encountered in the general population. Elaborate and exhaustive tests were not employed in the field. The patients detected having squint were referred to the base hospital where the execution of further investigations were possible.

Persons having manifest squint were classified into the following:

1. (a) Concomitant Squint (Primary mostly following anisometropic amblyopia)  
(Secondary to corneal opacity or cataract.)  
(b) Paralytic Squint.
2. Alternating Squint (Convergent.  
Divergent.

### Prevalence of Squint : (Table 50)

Out of a total of 12,743 cases examined in both the blocks 99 cases of squint (0.77%) were encountered. Majority of the cases encountered were of concomitant type. Out of a total of 99 cases encountered of squint, 98 cases (98.98%) were of concomitant variety while only 1 case (1.01%) was of paralytic squint.

Primary concomitant squint constituted 18 cases (18.18%) 11 males and 7 females, maximum number of cases in this group were in the 4th decade where 5 cases were seen (4 males and 1 female).

In the secondary type of concomitant squint (Table 51) maximum number of cases were seen in the first two decades (19 males & 18 females). The incidence of these cases was seen to decrease with age. A total of 80 cases (80.80%) were seen in the secondary group (31 males and 49

Table 50  
SQUINT

| Age Group                         | Unilateral |      |        |           |      |        | Bilateral            |      |        |                     |      |      | Total all Types |      |        | Total Percentage                    |
|-----------------------------------|------------|------|--------|-----------|------|--------|----------------------|------|--------|---------------------|------|------|-----------------|------|--------|-------------------------------------|
|                                   | Convergent |      |        | Divergent |      |        | Alternate convergent |      |        | Alternate Divergent |      |      |                 |      |        |                                     |
|                                   | M          | F    | T      | M         | F    | T      | M                    | F    | T      | M                   | F    | T    | M               | F    | T      |                                     |
| 0-10                              | 3          | 4    | 7      | 3         | 2    | 5      | 3                    | 2    | 5      | 1                   | 2    | 3    | 10              | 10   | 20     | 0.490                               |
| 11-20                             | 1          | 1    | 2      | 7         | 4    | 11     | 1                    | 1    | 2      | 1                   | 2    | 3    | .38†            | .54† | 18     | 0.620                               |
| 21-30                             | 4          | 5    | 9      | 4         | 3    | 7      | ...                  | ...  | ...    | ...                 | 2    | 2    | .64             | .58  | 18     | 1.030                               |
| 31-40                             | 2          | 3    | 5      | 3         | 4    | 7      | 1                    | ...  | 1      | ...                 | 2    | 2    | 1.10            | .98  | 15     | 1.140                               |
| 41-50                             | 2          | 3    | 5      | 2         | 4    | 6      | 1                    | ...  | 1      | ...                 | ...  | ...  | 1.08            | 1.18 | 12     | 1.230                               |
| 51-60                             | ...        | 2    | 2      | 1         | 3    | 4      | ...                  | ...  | ...    | ...                 | ...  | ...  | 1.01            | 1.45 | 6      | 0.870                               |
| 61-70                             | ...        | 4    | 4      | 1         | 2    | 3      | ...                  | 1    | 1      | ...                 | ...  | ...  | .27             | 1.52 | 8      | 1.780                               |
| Over 70                           | ...        | 1    | 1      | 1         | ...  | 1      | ...                  | ...  | ...    | ...                 | ...  | ...  | .40             | 3.53 | 2      | 0.840                               |
| Total                             | 12         | 23   | 35     | 22        | 22   | 44     | 6                    | 4    | 10     | 2                   | 8    | 10   | 42              | 57   | 99     | 0.770                               |
| %age out of 12,743                | ...        | ...  | 0.27   | ...       | ...  | 0.34   | ...                  | ...  | 0.07   | ...                 | ...  | 0.07 | ...             | ...  | 0.77   |                                     |
| %age out of males 6686            | 0.17       | ...  | ...    | 0.32      | ...  | ...    | 0.08                 | ...  | ...    | 0.02                | ...  | ...  | 0.62            | ...  | ...    |                                     |
| %age out of females 6057          | ...        | 0.37 | ...    | ...       | 0.36 | ...    | ...                  | 0.06 | ...    | ...                 | 0.13 | ...  | ...             | 0.94 | ...    |                                     |
| %age out of Total 99 squint cases | ...        | ...  | 35.35% | ...       | ...  | 44.44% | ...                  | ...  | 10.10% | ...                 | ...  | ...  | ...             | ...  | 10.10% | †%age in male and female population |

Table 51

## SQUINT

| Age Group      | Concomitant |        |       |           |        |       | Paralytic |        |       | Total                |        |
|----------------|-------------|--------|-------|-----------|--------|-------|-----------|--------|-------|----------------------|--------|
|                | Primary     |        |       | Secondary |        |       | Male      | Female | Total | Male                 | Female |
|                | Male        | Female | Total | Male      | Female | Total |           |        |       |                      |        |
| 0—10           | 1           | ...    | 1     | 9         | 10     | 19    | ...       | ...    | ...   | 10                   | 10     |
| 11—20          | ...         | ...    | ...   | 10        | 8      | 18    | ...       | ...    | ...   | 10                   | 8      |
| 21—30          | 3           | 1      | 4     | 5         | 9      | 14    | ...       | ...    | ...   | 8                    | 10     |
| 31—40          | 4           | 1      | 5     | 2         | 8      | 10    | ...       | ...    | ...   | 6                    | 9      |
| 41—50          | 1           | 3      | 4     | 4         | 4      | 8     | ...       | ...    | ...   | 5                    | 7      |
| 51—60          | 1           | 1      | 2     | ...       | 4      | 4     | ...       | ...    | ...   | 1                    | 5      |
| 61—70          | 1           | 1      | 2     | ...       | 5      | 5     | ...       | 1      | 1     | 1                    | 7      |
| Over 70        | ...         | ...    | ...   | 1         | 1      | 2     | ...       | ...    | ...   | 1                    | 1      |
| Total :        | 11          | 7      | 18    | 31        | 49     | 80    | ...       | 1      | 1     | 42                   | 57     |
| %age out of 99 | 18.18       |        |       | 80.80     |        |       | 1.010     |        |       | 0.777                |        |
|                |             |        |       |           |        |       |           |        |       | (out of 12743 cases) |        |



females). In this group 45.45% had convergent squint and 54.54% divergent squint. Franken-et-el (1968) found 0.226% convergent and 0.379% divergent squint, in the general population examined. Our figures for the same are 0.353% and 0.423%. Reporting from dry belt the author has given this ratio of convergent to divergent squint as 47.23% and 52.77% while our figures for the same are 45.45% and 54.54% respectively.

Paralytic squint was found only in one case (1.0%). This patient was a female in the seventh decade and was referred to the base hospital for diplopia test and other investigations. Franken (.68) has reported paralytic squint in 0.046% in total population from dry belt unlike our figures, of 0.007%.

## Chapter XII

### Phthisis Bulbi

Phthisis bulbi being an ocular mortality is of interest to us. Its prevalence being high (0.29%) needs a separate consideration (Table 52. Fig. 16)

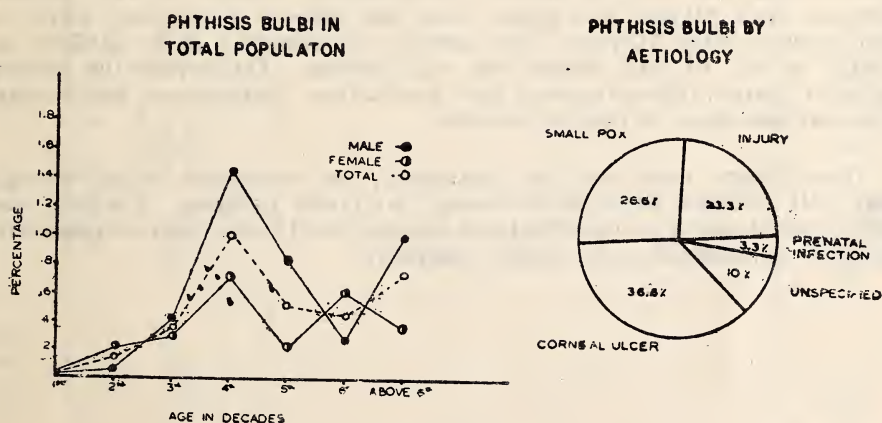


Fig. 16

#### Prevalence

The general incidence in the total population examined is 0.29%. In the male population it is 0.32% while in the females population it is 0.261%. Its bilateral occurrence is observed in 21.05% and unilateral in 78.95%.

In general it is 0.044% in the 1st decade, (0.038% in the males and 0.054% in the females), 0.137% in the second decade (0.064% in the males and 0.223% in the females); 0.344% in the 3rd decade (0.415% in the males and 0.294% in the females), 0.989% in the 4th decades (1.44% in the males and 0.657% in the females), 0.514% in the 5th decade (0.814% in the males and 0.207% in the females), 0.437% in the 6th decade (0.278% males and 0.611% females); 0.446% in the 7th decade (0.8% in the males only); 1.271% beyond 7th decade (1.351% in the males and 1.136% in the females).

Thus, the general prevalence rises upto 4th decade and then shows a progressive fall. The maximum rise in the 4th decade is due to corneal ulceration. The general incidence in this decade is twice as common in males as compared to females.

#### Aetiology:

In the unilateral group, corneal ulcer is maximum (36.6%) then in order are small pox (26.6%), not specified (10%), injury (occupational, foreign body, recreational) 23.3% and prenatal infection 3.3%.

While smallpox as such attacks children, the number of cases with phthisis bulbi in this study due to small pox are encountered in later age groups. Amongst the total 10 cases, only one is seen in the 1st decade. other nine are seen in later age groups. Maximum number of cases are encountered in the 3rd and 4th decades. This shows that small pox was common some time back but now it is considerably lessened. In 4447 persons examined upto 10 year age group, only one person is involved while in 8296 persons after 10 years, the number encountered is 9 (0.022% vs. 0.108%) a fall of 80% during the last decade. This reveals the general change in pattern following small pox eradication programme and increase in general awareness in the last decade.

Thus though small pox has decreased, the ulceration is still taking a heavy toll. People being agriculturists are prone to injury. It is here that timely medical care is so important and dissipation of knowledge on preventive aspects of ophthalmology is needed rigorously.

# PHTHISIS BULBI

[illegible]



## Chapter XIII

### Miscellaneous Diseases

#### A. Infections:

##### I. Lid Infections. (Table 53)

- a) Blepharitis
- b) Styne
- c) Lid abscess
- d) Chalazion
- e) Acute Dacryo-Cystitis.

#### Blepharitis:

0.42% of the population is affected as against 0.123% reported by Franken (1968) from dry belt. There is progressive fall upto fifth decade and then a small rise. After 3rd decade the curve is almost straight. The males are more affected (0.54%) as against females (0.29%). The difference is significant ( $p < .05$ ).

#### Stye :

The general involvement is 0.42%. The incidence being same in males and females. Franken-et-al found its prevalence rate as 0.056% in the dry belt of this region. In this study the maximum prevalence encountered is in the second decade.

#### Lid Abscess :

This was encountered in 0.16% of the cases.

#### Chalazion :

In general its incidence is 0.35%. There is no difference in males and females (0.34% in males and 0.36% females). This being maximum in the 4th decade. The general pattern does not correspond with either prevalence of trachoma or conjunctivitis. Franken-et-al reported its incidence as 0.211%.

Table 53

## MISCELLANEOUS DISEASES - Lid Infections

| Age Group                          | Group Population | Blepharitis |     |     | Stye |      |      | Lid Abscess |      |       | Chalazion |     |       | Dacryocystitis |     |     |       |     |     |     |       |
|------------------------------------|------------------|-------------|-----|-----|------|------|------|-------------|------|-------|-----------|-----|-------|----------------|-----|-----|-------|-----|-----|-----|-------|
|                                    |                  | M           | F   | T   | %    | M    | F    | T           | %    | M     | F         | T   | %     | M              | F   | T   | %     |     |     |     |       |
| 0-10                               | 4447             | 18          | 12  | 30  | 0.67 | 8    | 8    | 16          | 0.36 | 1     | ...       | 1   | 0.02  | 7              | 6   | 13  | 0.292 | ... | 1   | 1   | 0.02  |
| 11-20                              | 2899             | 10          | 3   | 13  | 0.45 | 10   | 12   | 22          | 0.76 | ...   | 1         | 1   | 0.03  | 6              | 2   | 8   | 0.276 | ... | ... | ... | ...   |
| 21-30                              | 1741             | 5           | 1   | 6   | 0.34 | 8    | 4    | 12          | 0.69 | ...   | ...       | ... | ...   | 3              | 5   | 8   | 0.459 | ... | ... | ... | ...   |
| 31-40                              | 1314             | 1           | 1   | 2   | 0.15 | ...  | 2    | 2           | 0.15 | ...   | ...       | ... | ...   | 3              | 4   | 7   | 0.533 | ... | ... | ... | ...   |
| 41-50                              | 972              | 1           | ..  | 1   | 0.10 | 1    | ...  | 1           | 0.10 | ...   | ...       | ... | ...   | 2              | 2   | 4   | 0.411 | ... | ... | ... | ...   |
| 51-60                              | 686              | 1           | ... | 1   | 0.14 | ...  | ...  | ...         | ...  | ...   | ...       | ... | ...   | 1              | 2   | 3   | 0.437 | ... | ... | ... | ...   |
| 61-70                              | 448              | ...         | 1   | 1   | 0.14 | 1    | ...  | 1           | 0.14 | ...   | ...       | ... | ...   | 1              | 1   | 2   | 0.292 | ... | ... | ... | ...   |
| Over 70                            | 236              | ...         | ... | ... | ...  | ...  | ...  | ...         | ...  | ...   | ...       | ... | ...   | ...            | ... | ... | ...   | ... | ... | ... | ...   |
| Total                              |                  | 36          | 18  | 54  | 0.42 | 28   | 26   | 54          | 0.42 | 1     | 1         | 2   | 0.016 | 23             | 22  | 45  | 0.35  | ... | 1   | 1   | 0.008 |
| %age out of 12743 Total population |                  |             |     |     |      |      |      |             |      |       |           |     |       |                |     |     |       |     |     |     |       |
| out of 6687 Total Males            | 0.54             |             |     |     |      | 0.42 |      |             |      | 0.014 |           |     | 0.34  |                |     |     |       | ... |     |     |       |
| out of 6056 Total Females          |                  | 0.29        |     |     |      |      | 0.43 |             |      |       | 0.016     |     | 0.36  |                |     |     |       |     |     |     | 0.017 |

## **Dacryo-Cystitis :**

Franken in his survey work has reported an incidence of 0.27% for chronic dacryo-cystitis and 0.65% for blocked ducts (total 0.92%). They tried dye test in cases of watering. In our own experience dye test gives very false negative results, and so no such test was conducted. However watering being a common complaint and without syringing it is difficult to reach at a diagnosis of blocked ducts. It is difficult to conduct such a test in survey. Previous history in cases of chronic dacryo-cystitis is usually not forthcoming for the simple reason that commonest cause of scarring encountered in this region is believed to be due to trachoma and this being such an insidious process that no past history is available.

All the same acute dacryo-cystitis was encountered in only one female in the first decade.

## **Lid Infections Compared. (Table 54)**

Blepharitis rate is higher in Kharar Block as compared to Raipur Rani block. Otherwise, chalazian, sty, phthisis bulbi do not show any change in the general pattern in the two areas surveyed.

## **Conjunctival and Corneal Infections. (Table 55)**

Survey being rural based, the mild irritative causes are a part of village life. Mostly, persons being agriculturists and the profession being still in the process of mechanisation, most of the work is done with hand and the help of animals. Thus both sowing and harvesting entail exposure to trauma. Superadded to this, are the general weather conditions with the maximum burden of work on the farmer throughout the year. Thus chances of getting conjunctivitis and corneal ulcerations are many.

Incidence of conjunctivitis encountered is 2.542% as against 9.49% reported from dry belt by Franken. It is highest in the first decade (4.47%) and then shows a progressive fall. Males are more affected as compared to the females (3.26% versus 1.75%). This is highly significant ( $p < .01$ ). This shows that even though working conditions for women are in no way better as they have to work in the smoke of kitchen most of the time, apart from going to the fields as well, but they are much less affected. The active corneal ulceration encountered was in 0.055%. The general incidence shows a rise with age upto 4th decade. In the male population the prevalence is 0.059% and in the females 0.049%. Thus it is not directly related to the field work and is not traumatic in most of the cases.

## **Superficial Punctate Keratitis :**

Only one patient was encountered in Kharar Block.

**Table 54**  
MISCELLANEOUS DISEASES. INFECTION OR ITS AFTERMATH

| Diseases                    | Kharar<br>(8,142) | Percentage | Raipur Rani<br>(4,601) | Percentage | Total<br>(12,743) | Percentage amongst<br>total examined |
|-----------------------------|-------------------|------------|------------------------|------------|-------------------|--------------------------------------|
| Blepharitis                 | 44                | 0.54       | 10                     | 0.21       | 54                | 0.423                                |
| Lid Abscess                 | 1                 | 0.01       | 1                      | 0.021      | 1                 | 0.016                                |
| Chalazion                   | 30                | 0.36       | 15                     | 0.32       | 45                | 0.353                                |
| Stye                        | 35                | 0.42       | 19                     | 0.41       | 54                | 0.423                                |
| Conjunctivitis (Ac. & Chr.) | 280               | 3.43       | 44                     | 0.95       | 324               | 2.542                                |
| Corneal Ulcer               | 6                 | 0.07       | 1                      | 0.021      | 7                 | 0.054                                |
| S.P. Keratitis              | 1                 | 0.01       | —                      | —          | 1                 | 0.008                                |
| Central Choroiditis         | —                 | —          | 1                      | 0.02       | 1                 | 0.008                                |
| Phthisis Bulbi              | 24                | 0.29       | 14                     | 0.30       | 38                | 0.298                                |
| Acute Dacryocystitis        | —                 | 0.01       | —                      | —          | 1                 | 0.008                                |



Table 55

MISCELLANEOUS DISEASES  
INFECTIONS OF CORNEA AND CONJUNCTIVA.

| Age Group                          | CONJUNCTIVITIS |        | Total  | Percentage | CORNEAL ULCER |        | Total | Percentage |
|------------------------------------|----------------|--------|--------|------------|---------------|--------|-------|------------|
|                                    | Male           | Female |        |            | Male          | Female |       |            |
| 0 — 10                             | 132            | 67     | 199    | 4.47       | —             | 1      | 1     | 0.02       |
| 11 — 20                            | 40             | 20     | 60     | 2.07       | 1             | —      | 1     | 0.09       |
| 21 — 30                            | 15             | 9      | 24     | 1.38       | 1             | —      | 1     | 0.06       |
| 31 — 40                            | 13             | 3      | 16     | 1.22       | 1             | —      | 1     | 0.08       |
| 41 — 50                            | 8              | 2      | 10     | 1.03       | —             | —      | —     | —          |
| 51 — 60                            | 7              | 4      | 11     | 1.60       | —             | 2      | 2     | 0.29       |
| 61 — 70                            | 3              | 1      | 4      | 0.89       | 1             | —      | 1     | 0.22       |
| Over 70                            | —              | —      | —      | —          | —             | —      | —     | —          |
| Total                              | 218            | 106    | 324    |            | 4             | 3      | 7     |            |
| Out of 12,743                      |                |        | 2,542  |            |               |        | 0.055 |            |
| Male: 6,687                        | 3.326%         |        | 0.059% |            |               |        |       |            |
| Fem: 6,056                         | 1.75%          |        |        |            |               |        | 0.049 |            |
| Significant in males ( $p < .01$ ) |                |        |        |            |               |        |       |            |

### **Conjunctival and Corneal Infections Compared:**

Both these infective conditions are much more common in Kharar Block. Conjunctivitis is 3.43% in the Kharar Block and 0.95% in the Raipur Rani Block while corneal ulceration is 0.07% in the former and 0.021% in the latter block.

### **Congenital Diseases (Table 56)**

Epicanthus is encountered in 0.008%, ptosis in 0.118%, ectropion in 0.016%, Congenital nevus in 0.22%, Limbal nevus in 0.016%, heredo-macular degeneraiton in 0.023%, congenital coloboma (iris and ciliary body) in 0.016%, opaque nerve fibres in 0.008%, and colour blindness, (red green deficiency) in 0.086%.

### **Allergic diseases (Table 57)**

0.063% is the general incidence of allergic disorders encountered. This is more in Kharar Block (0.074%) as compared to Raipur Rani Block (0.043%). The type of the disorders enlisted under this heading are allergic lid oedema, allergic dermatitis, spring catarrh and phlycten.

### **Other acquired diseases (Table 58,59)**

Other acquired diseases are tabulated. Pterygium, Pinguecula, Squint are separately discussed under separate headings.

**Table 56**  
MISCELLANEOUS DISEASES  
CONGENITAL

| Disease                                     | Kharar Block |                        | Raipur Rani Block |                        | Total No. of cases | %age out of 12743 |
|---------------------------------------------|--------------|------------------------|-------------------|------------------------|--------------------|-------------------|
|                                             | No. of cases | %age out of 8142 cases | No. of cases      | %age out of 4601 cases |                    |                   |
| Epicanthus                                  | 1            | 0.01                   | ...               | ...                    | 1                  | 0.008             |
| Ptosis                                      | 9            | 0.11                   | 6                 | 0.13                   | 15                 | 0.118             |
| Ectropion                                   | 2            | 0.02                   | ...               | ...                    | 2                  | 0.016             |
| Conjunctival Naevus                         | 12           | 0.14                   | 16                | 0.34                   | 28                 | 0.220             |
| Limbal Naevus                               | 2            | 0.02                   | ...               | ...                    | 2                  | 0.016             |
| Heredomacular degeneration                  | 1            | 0.01                   | 2                 | 0.04                   | 3                  | 0.023             |
| Congenital Coloboma (Iris, Choroid, Retina) | 1            | 0.01                   | 1                 | 0.02                   | 2                  | 0.016             |
| Opaque Nerve Fibers                         | 1            | 0.01                   | ...               | ...                    | 1                  | 0.008             |
| Colour Blindness                            | 11           | 0.135                  | ...               | ...                    | 11                 | 0.086             |
| Total number of cases                       | 40           |                        | 25                |                        | 65                 |                   |

**Table 57**

**MISCELLANEOUS DISEASES  
ALLERGIC DISEASES**

| Disease             | Kharar Block<br>(8,142) | Percentage | Raipur Rani Block<br>(4,601) | Percentage | Total<br>(12,743) | Percentage. |
|---------------------|-------------------------|------------|------------------------------|------------|-------------------|-------------|
| Allergic Lid Oedema | 3                       | 0.037      | 1                            | 0.022      | 4                 | 0.031       |
| Allergic Dermatitis | 1                       | 0.012      | —                            | —          | 1                 | 0.008       |
| Spring Catarrh      | —                       | —          | 1                            | 0.022      | 1                 | 0.008       |
| Phlycten            | 2                       | 0.025      | —                            | —          | 2                 | 0.016       |
| Total               | 6                       | 0.074      | 2                            | 0.044      | 8                 | 0.063       |



**Table 58**  
**MISCELLANEOUS DISEASES**

| Disease                            | Kharar Block (8,142) |            | Raipur Rani Block (4,601) |            | Total (12,743) |            |
|------------------------------------|----------------------|------------|---------------------------|------------|----------------|------------|
|                                    | Number               | Percentage | Number                    | Percentage | Number         | Percentage |
| Pigmentation of Conjunctiva        | 9                    | 0.11       | —                         | —          | 9              | 0.071      |
| Uveitis (Healed)                   | 6                    | 0.07       | 3                         | 0.065      | 9              | 0.071      |
| Retinal Detachment                 | —                    | —          | 1                         | 0.022      | 1              | 0.008      |
| Retinopathy (Arterio-sclerotic)    | —                    | —          | 1                         | 0.022      | 1              | 0.008      |
| Pigmentary degeneration of Retina. | 1                    | 0.01       | 1                         | 0.022      | 2              | 0.016      |
| Dystrophy                          | 1                    | 0.01       | —                         | —          | 1              | 0.008      |
| Operative Coloboma of lid          | —                    | —          | 1                         | 0.022      | 1              | 0.008      |
| Amyloidosis of Conjunctiva         | —                    | —          | 1                         | 0.022      | 1              | 0.008      |

**Table 59**

**MISCELLANEOUS DISEASES**

**OTHER ACQUIRED DISEASES**

| Disease               | Kharar Block<br>(8,142) | Percentage | Raipur Rani Block<br>(4,601) | Percentage | Total<br>(12,743) | Percentage |
|-----------------------|-------------------------|------------|------------------------------|------------|-------------------|------------|
| Nystagmus             | 5                       | 0.06       | 4                            | 0.087      | 9                 | 0.071      |
| Macular Burn          | 2                       | 0.02       | —                            | —          | 2                 | 0.016      |
| Leucoderma of the lid | 2                       | 0.02       | —                            | —          | 2                 | 0.016      |
| Conjunctival Cyst     | —                       | —          | 1                            | 0.02       | 1                 | 0.008      |

## CHAPTER XIV

### Summary And Conclusions

The results of survey conducted in the two blocks, Raipur Rani Block of Haryana and Kharar Block of Punjab, during the past two years and a half are presented. By drawing a simple random sample from one block and a stratified sample from the other block, a house to house survey was conducted to cover 5% and 8% of the population in the two blocks respectively. In all 12743 persons were examined, 52.50% being males and 47.50% females. The ratio of 1:0.90 so covered was akin to the general population distribution figures of 1:0.87 as taken from the figures projected from 1961 census.

77.290% of the persons so examined had perfectly normal vision while the rest 32.8% had vision less than normal in one or both the eyes. 5.132% had loss of vision because of refractive errors (2.777% being myopic while 2.354% hypermetropic). Rest of the loss could be accounted by various ocular diseases. The general pattern of both types of refractive errors is discussed.

The prevalence of economic blindness encountered is 3.2%. In male population it is 2.862% and in female population it is 3.616%. The significantly higher prevalence of blindness in females is due to presence of cataract which was more in females than in males, the prevalence of other blinding diseases remaining the same.

By site-type the involvement of lens was observed to be in maximum number and then in order of prevalence it was 'cornea sclera', 'site-type indefinite', 'eye ball in general', 'optic pathology' and lastly 'retinal diseases'.

Aetiologically senile changes act as causative agents in maximum number of cases. The next in order is 'infectious diseases'. The next group in order of frequency was 'aetiology indefinite or not reported group'. Injuries and poisonings and 'prenatal influence' were the next causes in that order.

69.690% of this blindness is curable and 30.490% incurable. The preventibility of blindness in general is 27.290%. In the series of curable blind this preventibility is 9.51% while in the incurable blindness series this preventibility is 67.74%. Unilateral blindness prevalence is almost same as bilateral blindness i.e. 3.272%. In causative factors, cataract rates first and then in order are 'corneal opacity', 'eye ball in general' and others. The similarity of general pattern in both the unilateral and bilateral blind is striking.

The general prevalence rate of trachoma was 54.86% (55.24% in males and 54.45% in females). Stage I & II was encountered in 15.15% while 84.85% had III and IV stage. 3.97% of all the trachoma patients had one of the trachoma sequelae i.e. entropion, trichiasis, xerosis. Entropion and trichiasis were seen in 1.35% while xerosis in 2.34%.

4.51% of the examined population were seen to have corneal opacities, (3.9% males and 5.1% females). Amongst the causes encountered, trachoma and miscellaneous group ranked first. Next in order of frequency were ulcer, smallpox, injury, surgery and dystrophy in that order. In 24% trachoma could be labelled as a definite cause while in the majority where no definite cause could be attributed or where trachoma was held responsible by implication, are grouped under miscellaneous heading.

The prevalence of corneal opacity in the female population was significantly higher in females as compared to males.

The bilaterality of the corneal opacities is 42.09% and the remaining 57.91% are unilateral. More than one fourth (26.26%) of these patients having corneal opacities were economically blind. Thus persons who need keratoplasty are 2.57% in the general population.

Cataract and aphakia combined were encountered in 10.484% in general population, (males 9.735%, females 11.331%). Only aphakia, without cataract, was encountered in 1.451% of the population (1.445% in males and 1.469% in females). While aphakia did not show any statistically significant difference between males and females, the combined group showed prevalence significantly more in the females than in the males. The higher prevalence was noticed in the 4th, 5th and 7th decades. 1.687% of the total population had mature cataract. (16.4% having bilateral and 83.6% unilateral cataract). For every 1000 patients of aphakia there were 1162 of cataract, who needed immediate surgery.

Glaucoma prevalence in general population was 0.486% (2.264% above 40 years, 1.641% above 30 years). Primary glaucoma was 58% and secondary glaucoma 42%. In all 45% of the glaucoma patients have reached the stage of 'absolute' glaucoma. The prevalence in females was significantly higher than in males.

Other diseases of the eye are grouped under headings of infection, allergies, congenital and other acquired diseases. Amongst these, pterygium, pinguecula, squint, are separately discussed while other less common diseases are tabulated. Phthisis bulbi is encountered in 0.29% of the population and accounts for 1.2% of the economic blind, therefore an additional separate space has been allotted for this.

#### Conclusions :

If we project these figures to the entire states of Punjab and Haryana (1971 census) the total number of blind are 750212

Curable blind are 522335

Incurable blind are 227877



Patients who can be immediately rehabilitated by cataract surgery are 395502 and the number of those who need corneal surgery is 602514. Apart from the urgency of relief work the problem of rehabilitation of incurable blind is also colossal in both the states. The need for creating a 'Rehabilitation and Vocational Counselling Unit' in each state with branches in each district, is the paramount need brought out by this survey. This would not only help the state to save colossal amount of money being lost by the unproductive blind people, but would also bring a ray of hope and a smile of cheer to this helpless mass of humanity, to be able to get social acceptability add permanent adjustment in the family and community.

If we calculate the loss in terms of earning capacity at the rate of Rs. 881/- per capita per annum the total loss in both the states is Rs. 66,09,36,772 per annum. And the loss due to the attendants who spend time at 2 hours/day in looking after the blind (taking the working hours as 8 hours/day) is Rs.165234193. The cost of supporting a blind man at the rate of Rs. 30/- per month per blind person is Rs. 2,70,07,632 per annum. Thus the gross loss to both the states is to the tune of Rs. 85,31,778,597 per annum (about Rs. 85 crores).

Now think of the human misery. Taking life expectancy to be 52 years the total period endured by the blind in perpetual darkness is over 52,70,638 years (over 5 million). This period can be made fruitful and worth living only if all the Govt. and private agencies look to this problem from human angle and take it up on priority basis.

# Serial No.

Card No.

Date

Sex  $\frac{M}{F}$

Name

Age

Occupation :

Address

Dependants  
S.M.C.W.

Income

Literate/illiterate

Nutrition : Good/Average/Poor  
Vegetarian/Non-Vegetarian

1. Student
2. Field Worker
3. Office Worker
4. Teacher/Engineer
5. Bussinessman
6. Housewife

Complaints :

Past History :

whether consulted the Doctor or not at any moment.

| EXAMINATION | R. E. | L. E. | EXAMINATION | R. E. | L. E. |
|-------------|-------|-------|-------------|-------|-------|
|-------------|-------|-------|-------------|-------|-------|

VISION :

Uncorrected

Corrected

Color Vision

REF. ERROR

WITH NUMBER

Myopia

Hyperopia

Asigmatism

Presbyopia

AMBLYOPIA :

SQUINT :

Paralytic

Concomitant

Convergent

Divergent

Vertical

LIDS :

Congenital

Inflammatory

Neoplasm

Any other affec-

tion

Lid Margin

CONJUNCTIVA :

Conjunctivitis

Bulbar

Limbus

Pannus

Progressive

Regressive

Herbert's pits

Scarring

PALPEBRAL

Follicles

1. Trachomatous

2. Spring Catarrh

3. Folliculosis

Papillae

Scarring

FORNIX :

PTERYGIUM

Nasal

Temporal

Both

Vascular & Fleahy

Thin & Avascular

Diagram for its

extent

Xerosis

Bitot's spots

and the site)

TRACHOMA :

Active

Healed

Stage

Sequalae

LAC. SAC :

CORNEA :

Ulcer

Vessels

Opacity

Nebular

Macular

Leucoma

Lucoma adh.

Staphyloma

| EXAMINATION            | R. E. | L. E. | EXAMINATION                  | R. E. | L. E. |
|------------------------|-------|-------|------------------------------|-------|-------|
| ETIOLOGY OF C. OPACITY |       |       | HYPERMATURE TYPE             |       |       |
| Post ulcer Infection   |       |       | Morgagnian                   |       |       |
| Traumatic              |       |       | Calcified capsule            |       |       |
| Trachoma               |       |       | Shrunken                     |       |       |
| Deep Keratitis         |       |       | Swollen lens                 |       |       |
| Dystrophy              |       |       | APHAKIA ;                    |       |       |
| Keratomalacia          |       |       | INTRAOcular                  |       |       |
| Chemicals              |       |       | PRESSURE                     |       |       |
| IRIS & C. BODY :       |       |       | Normal                       |       |       |
| IRIS :                 |       |       | Raised                       |       |       |
| Pupil                  |       |       | Glaucoma                     |       |       |
| LENS :                 |       |       | TYPE : Congenital            |       |       |
| Normal                 |       |       | Primary Narrow angle         |       |       |
| Cong. Cataract         |       |       | Open angle                   |       |       |
| Traumatic "            |       |       | SECONDARY                    |       |       |
| Diabetic "             |       |       | Cause                        |       |       |
| Senile "               |       |       | ABSOLUTE                     |       |       |
| Presenile "            |       |       | VITREOUS                     |       |       |
| Incipient—             |       |       | FUNDUS :                     |       |       |
| Cortical "             |       |       | OPTIC DISC                   |       |       |
| Nuclear "              |       |       | Macula                       |       |       |
| Color "                |       |       | Blood vessels                |       |       |
| Subluxated lens        |       |       | Any other positive) finding) |       |       |
| MATURE                 |       |       | EYEBALL & EXTRA              |       |       |
| Cortical "             |       |       | OCULAR MUSCLES               |       |       |
| Nuclear "              |       |       | Proptosis                    |       |       |
| Color                  |       |       | Panophthalmitis              |       |       |
|                        |       |       | Phthisis Bulbi               |       |       |
|                        |       |       | Nystagmus                    |       |       |
|                        |       |       | CRANIAL NERVE                |       |       |
|                        |       |       | PALSY PERIPHERAL             |       |       |
|                        |       |       | FIELDS                       |       |       |

## SUMMARY

Normal sighted/Partial sighted  
 One eye blind/Both eyes blind  
 Better than 6/60 but field restricted 20°  
 6/60 in better eye  
 3/60-6/60  
 2/60-3/60  
 Less than 2/60  
 Light projection  
 Light preception  
 Absolute blindness

## DIAGNOSIS

Refractive error  
 Lids  
 Pterygium  
 Trachoma  
 Squint  
 Corneal Opacity  
 Cataract  
 Aphakia  
 Glaucoma  
 Optic Atrophy  
 Any Other

Right Left

## REFRACTION

## TREATMENT



# Appendix II

EYE RELIEF, REHABILITATION & SURVEY PROJECT CHANDIGARH (INDIA)

Chief Investigator : Dr. I. S. Jain

DEPARTMENT OF OPHTHALMOLOGY,

Postgraduate Institute of Medical

Education & Research, Chandigarh.

## OPHTHALMOLOGIST'S REPORT OF EYE EXAMINATION

Card No. \_\_\_\_\_

O.P.D. No. \_\_\_\_\_

Name : first \_\_\_\_\_ middle \_\_\_\_\_ last \_\_\_\_\_

Address : Home No. \_\_\_\_\_ City or Village \_\_\_\_\_ Block \_\_\_\_\_ District \_\_\_\_\_

Date of birth or Age \_\_\_\_\_ Economic status v. poor/poor/average/good

Sex : ☐ Male \_\_\_\_\_ ☐ Female \_\_\_\_\_

Occupation before vision impairment \_\_\_\_\_

### I. HISTORY

A. Probable age at onset of severe vision impairment.

Right eye \_\_\_\_\_ Left eye \_\_\_\_\_

B. Severe ocular infections, injuries, operations, if any, with age at time of occurrence \_\_\_\_\_

C. Were patients parents blood relatives? \_\_\_\_\_ Is patient's ocular condition believed to have occurred in any blood relative(s)? \_\_\_\_\_ If so, what relationship(s)? \_\_\_\_\_

### II. MEASUREMENTS

A. Visual Acuity

Distant Vision  
With best correction  
with ordinary lenses

Near Vision  
With best correction  
with ordinary lenses

R.E. \_\_\_\_\_

L.E. \_\_\_\_\_

B.E. \_\_\_\_\_

B. Field of Vision.

Right Eye \_\_\_\_\_ Angle subtended by widest.

Left Eye \_\_\_\_\_ diameter of field of vision.



C. Intraocular Pressure

Tension in mm. Hg : R E.-----L.E.----- (Gm. wgt.-----Yr. of calibration-----)

III. CAUSE OF BLINDNESS OR SEVERE VISION IMPAIRMENT

- A. Present ocular condition (s) responsible for vision impairment. (If more than one, specify all but underline the one which probably first caused severe vision impairment) R.E.-----  
L.E.-----
- B. Preceding ocular condition; if any which led to present condition, or the underlined condition, specified in A. R.E.-----  
L.E.-----
- C. Etiology (underlying cause) of ocular condition primarily responsible for vision impairment (e.g. specific disease, injury poisoning, heredity or other prenatal influence) R.E.-----  
L.E.-----
- D. If etiology is injury or poisoning, indicate circumstances and kind of object or poison involved.-----
- E. Has patient had any nonocular disease, not specified in C, which could have contributed to the vision impairment?----- if so, specify-----

IV. PROGNOSIS AND RECOMMENDATIONS

- A. Is patient's vision impairment considered to be : Stable—Deteriorating  
—Capable of improvement—Uncertain—
- B. What treatment is recommended, if any?-----
- C. Is re examination advised?-----If so, after what interval?-----
- D. Other recommendations :-----

Examining Ophthalmologist

Date of examination-----

Signature-----

Coding-----  
RE A LE A BE A

# Appendix III

## STANDARD CLASSIFICATION OF CAUSES OF SEVERE VISION IMPAIRMENT AND BLINDNESS

1966 REVISION

### 1. CLASSIFICATION BY SITE AND TYPE OF AFFECTION

#### EYEBALL IN GENERAL

- 110 Glaucoma. Subdivided:
  - 111 Glaucoma, open angle
  - 112 Glaucoma, closed angle
  - 113 Glaucoma, type not specified

#### 115 Hydrophthalmos

#### 120 Microphthalmos

#### 125 Anophthalmos, congenital

#### 130 Albinism

#### 140 Myopia

#### 141 Other refractive error

#### 147 Multiple congenital ocular malformations

#### 150 Panophthalmitis, endophthalmitis

#### 155 Atrophic globe

#### 190 Other affection of eyeball

#### CORNEA, SCLERA

#### 310 Keratoconjunctivitis

#### 311 Interstitial keratitis

#### 314 Scleritis

#### 315 Pannus

#### 318 Other keratitis

#### 330 Keratomalacia

#### 340 Other corneal dystrophy

#### 370 Keratoconus

#### 390 Other affection of cornea or sclera

#### LENS

#### 410 Cataract, subdivided:

##### 411 Cataract, unoperated

##### 412 Cataract, operated

##### 413 Cataract, no report concerning operation

#### 420 Dislocated lens

#### 490 Other affection of lens

#### UVEAL TRACT

#### 510 Uveitis, iritis, iridocyclitis, choroiditis

#### 520 Chorioretinitis

#### 530 Choroidal degeneration

#### 570 Sympathetic ophthalmia

#### 575 Absence of iris, congenital

#### 590 Other affection of iris, ciliary body or choroid

#### RETINA

#### 610 Retinitis

#### 615 Retinopathy

#### 630 Retrolental fibroplasia

#### 640 Detachment of retina

#### 650 Retinitis pigmentosa

#### 660 Macular degeneration

#### 670 Other retinal degeneration

#### 690 Other affection of retina

#### OPTIC NERVE, OPTIC PATHWAY, VISUAL CENTER, OCULOMOTOR CENTERS

#### 710 Optic neuritis, including retrobulbar neuritis

#### 720 Optic nerve atrophy

#### 725 Coloboma of optic nerve, congenital

#### 730 Other affection of optic nerve

#### 750 Other affection of optic pathway or visual center

#### 770 Nystagmus

#### VITREOUS

#### 810 Vitreous haemorrhage

#### 890 Other affection of vitreous

#### SITE AND TYPE INDEFINITE OR NOT REPORTED

#### 915 Amblyopia

#### 950 Multiple affections reported without indication of priority as to cause of severe vision impairment. Subdivided:

##### \*951 Glaucoma and cataract without mention of retinal affection, any type, with or without other affection

##### \*952 Glaucoma and retinal affection, any type, without mention of cataract, with or without other affection

- °953 Cataract and retinal affection any type, without mention of glaucoma, with or without other affection
- °954 Glaucoma, cataract, and retinal affection, any type, with or without other affection
- °955 Glaucoma in any other combination
- °956 Cataract in any other combination
- °957 Retinal affection, any type, in any other combination
- °958 Myopia, degenerative, in an combination (category added for MRA)
- °979 All other
- 990 Site and type of affection not established on examination or not reported
- °Do not use for degenerative myopia. Code 958, instead.

## II. CLASSIFICATION BY ETIOLOGY

### INFECTIOUS DISEASES

- 11.00 Diphtheria
- 12.00 Fungus infection
- 13.00 Gonorrhea
- 14.00 Herpes simplex
- 14.50 Herpes Zoster
- 15.00 Measles
- 16.00 Meningococcal infection
- 17.00 Onchocerciasis
- 18.00 Rubella
- 19.00 Scarlet fever
- 20.10 Syphilis, specified as prenatal
- 20.20 Syphilis, other
- 21.10 Toxoplasmosis, specified as prenatal
- 21.20 Toxoplasmosis, other
- 22.00 Trachoma
- 23.00 Tuberculosis
- 24.00 Leprosy
- 28.10 Other identified infectious disease, specified as prenatal
- 28.20 Other identified infectious disease
- 29.10 Unidentified infectious disease, specified as prenatal
- 29.20 Unidentified infectious disease, other

### INJURIES, POISONINGS

#### A. Causal activity

- 31. Occupational activity
- 32. Military activity
- 33. Household activity
- 34. Recreational activity
- 35. Transportation, Traffic
- 36. Birth process
- 37. Surgical or medical procedure

- 38. Act of violence
- 39. Prenatal event
- 48. Other casual activity specified
- 49. Causal activity not specified or no specified causal activity
- B. Causal agent
- .01 Chemical causing burn
- .03 Radiation, including radiant heat
- .04 Firearm
- .05 Fireworks
- .06 Other explosive
- .07 Airgun or slingshot
- .08 Blow or fall
- .09 Foreign body in eye
- .11 Methyl alcohol
- .12 Lead
- .13 Oxygen
- .14 Quinine
- .15 Other toxic agent
- .18 Other nontoxic agent
- .19 Causal agent not specified or no specific causal agent

### NEOPLASMS

- 51.00 Retinoblastoma
- 52.00 Melanoma, malignant
- 53.00 Phakomatosis
- 56.00 Neoplasm of pituitary gland or stalk
- 57.0 Other intracranial neoplasm
- 59.00 Other neoplasm
- DISEASES OR DISORDERS NOT ELSEWHERE CLASSIFIED
- 61.00 Anemia or other blood disease
- 62.10 Diabetes mellitus
- 62.20 Senile degeneration.



Subdivided :

- 62.21 Senile degeneration indicated by reported diagnosis
  - 62.22 Senile degeneration assumed from age and other reported data
  - 62.30 Nutritional deficiency
  - 62.90 Other metabolic or growth disorder
  - 63.00 Renal disease other than complication of pregnancy
  - 64.10 Cerebrovascular condition
  - 64.90 Other disease of the circulatory system
  - 65.10 Multiple sclerosis
  - 65.20 Other demyelinating disease
  - 65.90 Other disease of the central nervous system
  - 66.00 Psychogenic disorder
  - 67.00 Complication of pregnancy
  - 68.00 Sarcoidosis
  - 69.00 Noninfectious inflammatory disease
  - 78.00 Other specified disease or disorder not elsewhere classified
- PRENATAL INFLUENCE NOT ELSEWHERE CLASSIFIED
- 80.00 Hereditary origin probable or

possible Subdivided:

- 80.10 Hereditary origin probable or possible, occurrence in genetic family reported
  - 80.20 Hereditary origin probable or possible, occurrence in genetic family not reported
  - 89.00 Congenital origin not elsewhere classified
- ETIOLOGY INDEFINITE OR NOT REPORTED
- 91.00 Unknown to science
  - 95.00 Multiple etiologies for cases of multiple affections included in site and type categories 950-979. Subdivided:
    - 95.01 Senile degeneration and diabetes mellitus, with or without other etiology
    - 95.02 Senile degeneration and other etiology except diabetes mellitus
    - 95.03 Diabetes mellitus and other etiology except senile degeneration
    - 95.99 All other
  - 99.00 Etiology not established on examination or not reported



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Blindness and  
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